

## The Army Ants of Mexico (Hymenoptera: Formicidae: Ecitoninae)

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**ABSTRACT:** This paper includes a list of the 45 known species and subspecies of Mexican army ants (Ecitoninae) along with their authors, description dates, and described castes; keys, along with over 250 original figures, specifically designed for identification of the Mexican forms; 21 distribution maps for 44 species and subspecies; alphabetical distribution lists arranged by genera-species-states, and by states-genera-species; a table of male flight periods; and cited references.

### Discussion

Monographs of the New World army ants, Ecitoninae (Gotwald, 1979), were published by Borgmeier (1955) and Watkins (1976). Although Borgmeier (1955) included keys (in German) and is still the best source of descriptions and references, and Watkins (1976) included keys (in English) and distribution maps, those keys are very difficult to use, primarily because of the large number of species included and the polymorphism of the worker caste. Also, several new forms have been described since 1955.

This present paper was prepared to aid people in their study of the army ants of Mexico. It includes keys, and figures, specifically designed for the Mexican forms; therefore, fewer species are included than in the previous monographs and the keys are much easier to use. Also, the distribution maps are more detailed and contain many new locality records. A table of male flight periods of Mexican army ants is included for the first time (Pl. 21).

This paper is based, in part, on 16 years of intermittent study of the army ants of Mexico by the present author. Most of my expeditions to Mexico were made during the periods of December through January, and April through August, and included visits to most of the states in Mexico, except those in the extreme northwest (i.e., Chihuahua, Sonora, Baja California). During this period, most of the already widely-scattered small areas of Tropical Rain Forests have been cleared to make way for intensive cultivation and grazing. I was especially disappointed to discover in June 1980, that one of my frequent study sites, a small relic tropical forest along the Rio Corona northeast of Ciudad Victoria and only 180 miles south of Brownsville, Texas, was being cleared. This is the northern-most locality for several army ant species including *Eciton burchelli*. Of the few remaining patches of Tropical Rain Forests in Mexico, my favorite study area is the Archeo-

logical Zone near Palenque, Chiapas, where I have collected 17 species of army ants including all five New World genera.

Most of the army ant species in Mexico tend to be confined to the lower tropical zones, except for a few species such as *Labidus coecus*, *Neivamyrmex swainsoni*, *N. harrisi*, *N. agilis*, *N. nigrescens*, *N. macropterus*, *N. minor*, and *N. pilosus*, which are also found in the more temperate arid regions of northern Mexico.

The army ant species most frequently encountered in eastern and southern Mexico is *Labidus praedator*. This is in part due to the spectacular epigaecic swarm raids of these black workers which often cover several square meters of ground as they pass through camp sites. It is not uncommon to see Mexicans pouring soapy water on these swarms to divert them from their homes and businesses. On the other hand, the more broadly distributed hypogaecic workers of *L. coecus* are rarely seen, but males of both species of *Labidus* are common at lights throughout their ranges during their flight periods (Pl. 21).

The most frequently observed species of *Eciton* in Mexico is *E. burchelli*. This is due to a broad distribution and the epigaecic nesting, raiding, and migrating of the large workers. The males are only weakly attracted to ultraviolet light and I have never collected more than six during one night. Although also epigaecic, workers of *E. hamatum* are less frequently encountered within their more limited range (Map 4); however, males seem to be more strongly attracted to ultraviolet light and are sometimes collected in large numbers. These males are reddish brown in contrast to the more yellowish brown males from Panama. The other two species of *Eciton* (*E. vagans*, *E. mexicanum*) reported from Mexico are relatively rare. Six of the eleven collection records of *E. vagans* workers were made by me near Palenque, and *E. mexicanum* workers have been collected from only two widely separated areas (Map 4). Schneirla collected workers of *E. mexicanum* from three localities in southern Chiapas in 1945, and I collected workers from one colony near Tamazunchale, San Luis Potosi, in 1979. Also, the males which I reported (Watkins, 1976) as *E. uncinatum* were collected from the same locality near Tamazunchale, and since these males differ only slightly from those of "typical" *E. mexicanum*, they most likely belong to this species. There are no records of *E. vagans* males from Mexico.

Although 34 species of *Neivamyrmex* have been recorded from Mexico, workers of any one species are infrequently encountered, and I have collected large numbers of males (more than 50 per week) of only six species (*N. fumosus*, *N. swainsoni*, *N. pilosus*, *N. guerini*, *N. melsheimeri*, *N. longiscapus*). This is due, in part, to the mostly hypogaecic habits of the small workers, the limited flight periods of the males, and, perhaps, the small numbers of localities (as indicated by collection records) which they inhabit. According to available records, only three (*N. harrisi*, *N. swainsoni*, *N. pilosus*) of the

34 species have been collected from more than ten different localities in Mexico, and six species have each been collected from only one locality. Also, 17 of the above species are known only from males, ten only from workers, one from workers and queens, and six from all three castes. *Neivamyrmex inflatus*, known only from the male caste, is included in a key for the first time. I examined the original description (Borgmeier, 1958) and six males: one from Puerto Vallarta, Nayarit (about 75 miles from Tepic, the type locality); three from Campeche, Campeche; one from Chichen-Itza, Yucatan; and one from Middlesex, British Honduras. The males from Yucatan and British Honduras have larger frontal depressions (Pl. 10, Fig. 15), more rounded apices of the stipites (Pl. 15, Fig. 11), and slightly different volsellae and sagittae than those from Nayarit (Pl. 10, Fig. 17; Pl. 15, Fig. 13); however, males from Campeche are somewhat intermediate in these characteristics. *Neivamyrmex fuscipennis* is reported from Mexico for the first time. I observed and collected several males flying in bright sunshine from 7:00 to 8:00 a.m. on June 18–19, 1980, in the El Banito Trailer Park, nine miles south of Ciudad Valles, San Luis Potosi. Although an ultraviolet light trap was operated in the same area from dusk to dawn during both previous nights, no males of this species were trapped. These males have black wings and are easy to distinguish from males of the closely related *N. macropterus* which have larger, yellowish brown wings; however, males of these two “species” in the United States integrade in all their characteristics and are sometimes difficult to distinguish (Watkins, 1975).

Only one species of *Cheliomyrmex* (*C. morosus*) and two species of *No-mamyrmex* (*N. hartigi*, *N. esenbecki*) have been reported from Mexico. Workers of both genera are infrequently encountered; however, males are frequently collected at lights, and I have taken large numbers of males of *C. morosus* and *N. hartigi* in an ultraviolet light trap near Palenque, Chiapas, during May and June. Two subspecies of *N. esenbecki* (*N. e. mordax*, a western form; and *N. e. wilsoni*, an eastern form) occur in Mexico (Watkins, 1977). Although *N. e. wilsoni* has a much larger range (south Texas to Costa Rica), it has been less frequently collected than *N. e. mordax*.

List of Species, Subspecies, Authors, Dates and  
Known Castes of Mexican Army Ants  
(w = worker, q = queen, m = male)

*Cheliomyrmex*

*morosus* (F. Smith, 1859), wm

*Eciton*

*burchelli parvispinum* Forel, 1899, wqm

*hamatum* (Fabricius, 1781), wqm

*mexicanum* s. str. Roger, 1863, wqm

*vagans angustatum* Roger, 1863, wqm

*Labidus*

- coecus* (Latreille, 1802), wqm  
*praedator s. str.* (Fr. Smith, 1858), wqm

*Neivamyrmex*

- agilis* Borgmeier, 1953, w  
*andrei* (Emery, 1901), m  
*angulimandibulatus* Watkins, 1974, m  
*cloosae* (Forel, 1912), m  
*cornutus* Watkins, 1975, w  
*diabolus* (Forel, 1912), m  
*fallax* Borgmeier, 1953, w  
*fumosus* (Forel, 1913), m  
*fuscipennis* (Wheeler, 1908), m  
*graciellae* (Mann, 1926), w  
*guerini* (Shuckard, 1840), m  
*halidayi* (Shuckard, 1840), m  
*harrisi* (Haldeman, 1852), wqm  
*impudens* (Mann, 1922), w  
*inflatus* Borgmeier, 1958, m  
*klugi distans* Borgmeier, 1953, m  
*leonardi* (Wheeler, 1915), w  
*longiscapus* Borgmeier, 1953, m  
*macropterus* Borgmeier, 1953, m  
*manni* (Wheeler, 1914), w  
*melanocephalus* (Emery, 1895), w  
*melsheimeri* (Haldeman, 1852), m  
*minor* (Cresson, 1872), m  
*nigrescens* (Cresson, 1872), wqm  
*opacithorax* (Emery, 1894), wqm  
*pauxillus* (Wheeler, 1903), wq  
*pilosus mandibularis* (M. R. Smith, 1942), m  
*pilosus mexicanus* (Fr. Smith, 1859), wqm  
*rugulosus* Borgmeier, 1953, w  
*spinolai* (Westwood, 1842), wqm  
*spoliator* (Forel, 1899), m  
*sumichrasti* (Norton, 1868), w  
*swainsoni* (Shuckard, 1840), m  
*texanus* Watkins, 1972, wqm  
*tristis* (Forel, 1901), m

*Nomamyrmex*

- esenbecki mordax* (Santschi, 1928), wm  
*esenbecki wilsoni* (Santschi, 1920), wm  
*hartigi* (Westwood, 1842), wm

## Keys to Genera of Mexican Army Ants

## WORKERS

1. Postpetiole absent (Pl. 7, Fig. 8) ..... *Cheliomyrmex*
- Postpetiole present (Pl. 4, Fig. 1; Pl. 5, Figs. 1, 5; Pl. 6, Fig. 1) ... 2
2. Concave surface of tarsal claw without tooth (Pl. 19, Fig. 20)  
..... *Neivamyrmex*
- Concave surface of tarsal claw with small tooth (Pl. 19, Figs. 21–24)  
..... 3
3. Antennal scape thick (apical width greater than one-third its length;  
Pl. 3, Figs. 7–10) ..... *Nomamyrmex*
- Antennal scape slender (apical width less than one-third its length;  
Pl. 1, Figs. 1–4; Pl. 3, Figs. 4–6) ..... 4
4. Posterodorsal corners of propodeum with teeth or lamellae (Pl. 4,  
Figs. 1–4) ..... *Eciton*
- Posterodorsal corners of propodeum rounded and without teeth or  
lamellae (Pl. 5, Figs. 5, 6) ..... *Labidus*

## MALES (genitalia, Pl. 20)

1. Gastric tergites with conspicuous tufts of long, dense setae (Pl. 9,  
Figs. 16–18) ..... *Nomamyrmex*
- Gastric tergites without distinct tufts of setae ..... 2
2. Subgenital plate with three or four apical teeth—two outer apical  
and one or two small inner subapical (Pl. 12, Figs. 1, 9–16; Pl. 13,  
Figs. 4–18)—exception: *N. klugi* has only two subgenital plate teeth,  
but its two “teeth” on the lower border of the clypeus (Pl. 9, Fig. 13)  
and small size (length about 10 mm) will separate it from all species  
in couplet 2.b ..... 3
- Subgenital plate with only two apical teeth (Pl. 12, Figs. 5–8; Pl. 13,  
Figs. 1, 2) ..... 4
3. Length 6–16 mm; antennal flagellum distinctly longer than head  
width ..... *Neivamyrmex*
- Length 19–22 mm; antennal flagellum about as long as width of head  
..... *Cheliomyrmex*
4. Mandibles sickle-shaped (Pl. 9, Figs. 8, 9); subgenital plate spoon-  
shaped (Pl. 13, Figs. 1, 2) ..... *Labidus*
- Mandibles not sickle-shaped (Pl. 9, Figs. 2–7); subgenital plate elon-  
gate (Pl. 12, Figs. 5–8) ..... *Eciton*

Table 1. Key characteristics of genera of male army ants.

	<i>Noma.</i>	<i>Neiv.</i>	<i>Chelio.</i>	<i>Labidus</i>	<i>Eciton</i>
Tufts of long setae on gastric tergites	+	—	—	—	—
No. apical teeth subgenital plate	2	2 <sup>1</sup> , 3, 4	4	2	2
Sickle-shaped mandibles	+	+—	+	+	—
Total length (mm)	16–21	6–16	19–21	17–20	15–18
Setae present on apex of sagitta	+	—	+	+	—

<sup>1</sup> *Neivamyrmex klugi* is the only Mexican species of *Neivamyrmex* with only two teeth on the subgenital plate.

List (Alphabetical) of Mexican Army Ants  
State: Genus: Species

AGUASCALIENTES

*Neivamyrmex*  
*harrisi*

BAJA CALIFORNIA NORTE

*Neivamyrmex*  
*leonardi*  
*minor*  
*nigrescens*  
*swainsoni*

BAJA CALIFORNIA SUR

*Neivamyrmex*  
*leonardi*  
*minor*  
*opacithorax*

CAMPECHE

*Cheliomyrmex*  
*morosus*  
*Eciton*  
*hamatum*  
*Neivamyrmex*  
*diabolus*  
*fumosus*  
*guerini*  
*inflatus*  
*melsheimeri*  
*pilosus mexicanus*  
*swainsoni*

*Nomamyrmex*  
*hartigi*

CHIAPAS

*Cheliomyrmex*  
*morosus*  
*Eciton*  
*burchelli parvispinum*  
*hamatum*  
*mexicanum s. str.*  
*vagans angustatum*

*Labidus*

*coecus*  
*praedator s. str.*

*Neivamyrmex*

*fumosus*  
*guerini*  
*halidayi*  
*klugi distans*  
*longiscapus*  
*melsheimeri*  
*pilosus mexicanus*  
*spoliator*  
*sumichrasti*  
*swainsoni*  
*tristis*

*Nomamyrmex*

*esenbecki wilsoni*  
*hartigi*

## CHIHUAHUA

*Labidus**coecus**Neivamyrmex**agilis**harrisi**macropterus**swainsoni*

## COAHUILA

*Labidus**coecus**Neivamyrmex**harrisi**minor**pilosus mexicanus**swainsoni*

## COLIMA

*Eciton**burchelli parvispinum**Neivamyrmex**andrei**halidayi**harrisi**pilosus mandibularis**Nomamyrmex**esenbecki mordax*

## DISTRITO FEDERAL

*Labidus**coecus*

## DURANGO

*Neivamyrmex**harrisi**macropterus**swainsoni**Nomamyrmex**esenbecki mordax*

## GUERRERO

*Eciton**burchelli parvispinum**Neivamyrmex**cloosae**Nomamyrmex**esenbecki mordax*

## HIDALGO

*Cheliomyrmex**morosus**Labidus**coecus**Neivamyrmex**manni**melanocephalus**pauxillus**texanus*

## JALISCO

*Eciton**burchelli parvispinum**Labidus**coecus**Neivamyrmex**agilis**graciellae**harrisi**melanocephalus**opacithorax**pilosus mandibularis**rugulosus**swainsoni**texanus**Nomamyrmex**esenbecki mordax*

## MICHOACAN

*Labidus**coecus**Neivamyrmex**fallax**melanocephalus**Nomamyrmex**esenbecki mordax*

## MORELOS

*Neivamyrmex**cornutus**Nomamyrmex**esenbecki mordax*

## NAYARIT

*Labidus**coecus**Neivamyrmex**andrei**harrisi**inflatus**melanocephalus**nigrescens**pilosus mandibularis**rugulosus**Nomamyrmex**esenbecki mordax*

## NUEVO LEON

*Labidus**coecus**praedator s. str.**Neivamyrmex**harrisi*

## OAXACA

*Eciton**burchelli parvispinum**hamatum**vagans angustatum**Labidus**coecus**praedator s. str.**Neivamyrmex**cornutus**fallax**graciellae**halidayi**nigrescens**swainsoni**Nomamyrmex**esenbecki mordax*

## PUEBLA

*Eciton**burchelli parvispinum**Labidus**praedator s. str.**Neivamyrmex**macropterus**melsheimeri**pilosus mexicanus**swainsoni*

## QUINTANA ROO

*Eciton**burchelli parvispinum**Neivamyrmex**fumosus**guerini**melsheimeri*

## SAN LUIS POTOSI

*Cheliomyrmex**morosus**Eciton**burchelli parvispinum**mexicanum s. str.**Labidus**coecus**praedator s. str.**Neivamyrmex**fuscipennis**impudens**longiscapus**melsheimeri**pilosus mexicanus**swainsoni**texanus**tristis*

## SINALOA

*Eciton**burchelli parvispinum**Labidus**coecus**Neivamyrmex**andrei**harrisi**pilosus mandibularis**swainsoni**Nomamyrmex**esenbecki mordax*



## SONORA

*Neivamyrmex*

*harrisi*  
*nigrescens*  
*rugulosus*  
*swainsoni*

*Nomamyrmex*

*esenbecki mordax*

## TABASCO

*Neivamyrmex*

*fumosus*  
*halidayi*  
*longiscapus*  
*pilosus mexicanus*

## TAMAULIPAS

*Eciton*

*burchelli parvispinum*

*Labidus*

*coecus*

*Neivamyrmex*

*harrisi*  
*leonardi*  
*melsheimeri*  
*pilosus mexicanus*  
*swainsoni*

*Nomamyrmex*

*esenbecki wilsoni*

## VERACRUZ

*Cheliomyrmex*

*morosus*

*Eciton*

*burchelli parvispinum*  
*hamatum*

*Labidus*

*coecus*  
*praedator s. str.*

*Neivamyrmex*

*andrei*  
*angulimandibulatus*  
*diabolus*  
*guerini*  
*halidayi*  
*longiscapus*  
*melsheimeri*  
*pilosus mexicanus*  
*spinolai*  
*spoliator*  
*sumichrasti*  
*swainsoni*  
*tristis*

*Nomamyrmex*

*esenbecki wilsoni*  
*hartigi*

## YUCATAN

*Eciton*

*burchelli parvispinum*  
*hamatum*  
*vagans angustatum*

*Labidus*

*praedator s. str.*

*Neivamyrmex*

*fumosus*  
*guerini*  
*impudens*  
*inflatus*  
*melsheimeri*  
*swainsoni*

*Nomamyrmex*

*esenbecki wilsoni*  
*hartigi*

## ZACATECAS

*Neivamyrmex*

*harrisi*

## List (Alphabetical) of Mexican Army Ants

Genus: Species: State

*CHELIOMYRMEX**C. morosus*

Campeche

Chiapas

Hidalgo

San Luis Potosi

Veracruz

Distrito Federal

Hidalgo

Jalisco

Michoacan

Nayarit

Nuevo Leon

Oaxaca

San Luis Potosi

*ECITON**E. burchelli parvispinum*

Chiapas

Colima

Guerrero

Jalisco

Oaxaca

Puebla

Quintana Roo

San Luis Potosi

Sinaloa

Tamaulipas

Veracruz

Yucatan

Sinaloa

Tamaulipas

Veracruz

*L. praedator s. str.*

Chiapas

Nuevo Leon

Oaxaca

Puebla

San Luis Potosi

Veracruz

Yucatan

*E. hamatum*

Campeche

Chiapas

Oaxaca

Veracruz

Yucatan

*E. mexicanum s. str.*

Chiapas

San Luis Potosi

*E. vagans angustatum*

Chiapas

Oaxaca

Yucatan

*NEIVAMYRMEX**N. agilis*

Chihuahua

Jalisco

*N. andrei*

Colima

Nayarit

Sinaloa

Veracruz

*N. angulimandibulatus*

Veracruz

*N. cloosae*

Guerrero

*N. cornutus*

Morelos

Oaxaca

*N. diabolus*

Campeche

Veracruz

*LABIDUS**L. coecus*

Chiapas

Chihuahua

Coahuila

- N. fallax*  
 Michoacan  
 Oaxaca  
*N. fumosus*  
 Campeche  
 Chiapas  
 Quintana Roo  
 Tabasco  
 Yucatan  
*N. fuscipennis*  
 San Luis Potosi  
*N. graciellae*  
 Jalisco  
 Oaxaca  
*N. guerini*  
 Campeche  
 Chiapas  
 Quintana Roo  
 Veracruz  
 Yucatan  
*N. halidayi*  
 Chiapas  
 Colima  
 Oaxaca  
 Tabasco  
 Veracruz  
*N. harrisi*  
 Aguascalientes  
 Chihuahua  
 Coahuila  
 Durango  
 Jalisco  
 Nayarit  
 Nuevo Leon  
 Sinaloa  
 Sonora  
 Tamaulipas  
 Zacatecas  
*N. impudens*  
 San Luis Potosi  
 Yucatan  
*N. inflatus*  
 Campeche  
 Nayarit  
 Yucatan  
*N. klugi distans*  
 Chiapas  
*N. leonardi*  
 Baja California Norte  
 Baja California Sur  
 Tamaulipas  
*N. longiscapus*  
 Chiapas  
 San Luis Potosi  
 Tabasco  
 Veracruz  
 Yucatan  
*N. macropterus*  
 Chihuahua  
 Durango  
 Puebla  
*N. manni*  
 Hidalgo  
*N. melanocephalus*  
 Hidalgo  
 Jalisco  
 Michoacan  
 Nayarit  
*N. melsheimeri*  
 Campeche  
 Chiapas  
 Puebla  
 Quintana Roo  
 San Luis Potosi  
 Tamaulipas  
 Veracruz  
 Yucatan  
*N. minor*  
 Baja California Norte  
 Baja California Sur  
 Coahuila  
*N. nigrescens*  
 Baja California Norte  
 Nayarit  
 Isla Maria Cleofas  
 Isla Maria Magdalena

- Oaxaca  
 Sonora  
*N. opacithorax*  
   Baja California Sur  
   Jalisco  
*N. pauxillus*  
   Hidalgo  
*N. pilosus mandibularis*  
   Colima  
   Jalisco  
   Nayarit  
   Sinaloa  
*N. pilosus mexicanus*  
   Campeche  
   Chiapas  
   Coahuila  
   Puebla  
   San Luis Potosi  
   Tabasco  
   Tamaulipas  
   Veracruz  
*N. rugulosus*  
   Jalisco  
   Nayarit  
   Sonora  
*N. spinolai*  
   Veracruz  
*N. spoliator*  
   Chiapas  
   Veracruz  
*N. sumichrasti*  
   Chiapas  
   Veracruz  
*N. swainsoni*  
   Baja California  
   Campeche  
   Chiapas  
   Chihuahua  
   Coahuila  
   Durango  
   Jalisco  
   Oaxaca  
   Puebla  
   San Luis Potosi  
   Sinaloa  
   Sonora  
   Tamaulipas  
   Veracruz  
   Yucatan  
*N. texanus*  
   Hidalgo  
   Jalisco  
   San Luis Potosi  
*N. tristis*  
   Chiapas  
   San Luis Potosi  
   Veracruz  
 NOMAMYRMEX  
*N. esenbecki mordax*  
   Colima  
   Durango  
   Guerrero  
   Jalisco  
   Michoacan  
   Morelos  
   Nayarit  
   Oaxaca  
   Sinaloa  
   Sonora  
*N. esenbecki wilsoni*  
   Chiapas  
   Tamaulipas  
   Veracruz  
   Yucatan  
*N. hartigi*  
   Campeche  
   Chiapas  
   Veracruz  
   Yucatan

Keys to Species of Mexican Army Ants

(Number in parentheses after each species refers to a distribution map)

CHELIOMYRMEX

*Cheliomyrmex morosus* (3) is the only species of this genus known from Mexico. Worker (Pl. 3, Fig. 3; Pl. 7, Fig. 8; Pl. 8, Fig. 18). Male (Pl. 9, Fig. 1; Pl. 12, Fig. 1; Pl. 14, Fig. 1; Pl. 16, Fig. 9; Pl. 18, Fig. 10; Pl. 19, Fig. 24).

ECITON

SOLDIERS

- 1. Head yellowish; propodeal teeth triangular (Pl. 4, Figs. 1, 4, lateral views) and separated (Pl. 4, Figs. 5, 8, dorsal view) ..... 2
- Head reddish-brown; propodeal teeth spinous (Pl. 4, Fig. 2, lateral view) or fused (Pl. 4, Fig. 6, dorsal view) ..... 3
- 2. Head glossy; petiole elongate rectangular (Pl. 4, Fig. 8, dorsal view) ..... *hamatum* (4)
- Head dull; petiole subquadrate trapezoidal (Pl. 4, Fig. 5, dorsal view) ..... *burchelli* (6)
- 3. Propodeal teeth partially or completely fused (Pl. 4, Fig. 6, dorsal view) ..... *mexicanum* (4)
- Propodeal teeth separated and distinctly spinous (Pl. 4, Figs. 2, 7) ..... *vagens* (5)

MALES

- 1. Mandible slender and without an inner subapical corner or projection (Pl. 9, Fig. 2) ..... *burchelli* (6)
- Mandible broad and with an inner subapical corner or projection (Pl. 9, Figs. 3–7) ..... 2
- 2. Mandible distinctly triangular and with a slender, strongly curved apical tooth (Pl. 9, Figs. 3, 4) ..... *mexicanum* (4)
- Mandible not distinctly triangular, but broad with an inner subapical tooth or corner and with a smaller gradually tapered apical tooth (Pl. 9, Figs. 5–7) ..... 3
- 3. Gaster with long scattered setae; claw with small tooth on inner surface; length of mandible about equal height of head (Pl. 9, Fig. 5) ..... *hamatum* (4)
- Gaster without long setae; claw without tooth on inner surface; length of mandible about one and one-half times height of head (Pl. 9, Fig. 7) ..... *vagens* (5)

LABIDUS

WORKERS

- 1. Petiole with anteroventral tooth (Pl. 5, Fig. 5); color reddish brown ..... *coecus* (1)

- Petiole without anteroventral tooth (Pl. 5, Fig. 6); color black to blackish brown ..... *praedator* (2)

## MALES

1. Lower border of clypeus concave in the middle (Pl. 9, Fig. 8); posterior corners of petiole strongly projecting; volsella somewhat hook-shaped with a posterior projection (Pl. 18, Fig. 15) ..... *coecus* (1)
- Lower border of clypeus almost straight in middle (Pl. 9, Fig. 9); posterior corners of petiole not strongly projecting; volsella somewhat pick-shaped with sharp dorsal and ventral projection (Pl. 18, Fig. 16) ..... *praedator* (2)

## NEIVAMYRMEX

## WORKERS

1. Head smooth and glossy with scattered punctations ..... 2
- Head finely to coarsely granulated ..... 13
2. Eye with distinct convex cornea, and apex of antennal scape clearly reaches or exceeds eye level (Pl. 1, Figs. 5, 7-10; Pl. 2, Figs. 1, 2) ..... 3
- Eye without a distinct convex cornea—reduced to yellow speck or absent, and apex of antennal scape does not exceed eye level or middle of head if eye is absent (Pl. 1, Fig. 6; Pl. 2, Figs. 3, 4; Pl. 3, Figs. 1, 2) ..... 9
3. Petiole subquadrate (Pl. 8, Fig. 1, dorsal view) ..... *harrisi* (7)
- Petiole elongate or somewhat oval (Pl. 8, Figs. 2-7, dorsal view) ..... 4
4. From a dorsal view, the concave portion of the posterior head margin appears slightly narrower than the greatest width of the alitrunk (Pl. 8, Figs. 2-5); anteroventral tooth of petiole sharp pointed or distinctly angular—although very small on *N. melanocephalus* (Pl. 6, Figs. 2-5) ..... 5
- From a dorsal view, the concave portion of posterior head margin appears as wide or wider than the greatest width of alitrunk (Pl. 8, Figs. 6-7); anteroventral tooth of petiole bluntly rounded or absent (Pl. 6, Figs. 6, 7) ..... 8
5. Head blackish brown to black ..... 6
- Head yellowish brown to reddish brown ..... 7
6. Head and alitrunk about same color; anteroventral tooth of petiole prominent with an acute spine directed posteroventrad (Pl. 6, Fig. 2) ..... *pilosus* (8)
- Head and gaster blackish brown, alitrunk reddish brown; anteroventral tooth of petiole small and directed ventrad (Pl. 6, Fig. 3) ..... *melanocephalus* (9)
7. Anteroventral tooth of petiole large and triangular (Pl. 6, Fig. 4);

- lamella in front of antennal fossa narrow or absent (Pl. 1, Fig. 9) ..... *graciellae* (9)
- Anteroventral tooth of petiole spinous (Pl. 6, Fig. 5); lamella in front of antennal fossa broad (Pl. 1, Fig. 10) ..... *impudens* (9)
8. Head and gaster of smaller workers blackish brown or reddish brown with a blackish overcast, alitrunk reddish brown without a blackish overcast; dorsum of promesonotum slightly convex, and dorsum of propodeum as short or shorter than node of petiole (lateral view, Pl. 6, Fig. 6) ..... *manni* (10)
- Head and alitrunk same color (reddish brown), gaster slightly lighter; posterior one-half of dorsum of promesonotum flattened, and dorsum of propodeum longer than node of petiole (lateral view, Pl. 6, Fig. 7) ..... *opacithorax* (10)
9. Suture between promesonotum and mesopleuron, in profile, complete and distinct (Pl. 6, Fig. 8); apex of antennal scape almost reaches eye level (Pl. 2, Fig. 3); petiole elongate (about one and one-half times longer than wide, dorsal view, Pl. 8, Fig. 8) ... *agilis* (10)
- Suture between promesonotum and mesopleuron, in profile, incomplete (Pl. 6, Figs. 9, 10; Pl. 7, Figs. 1, 2); apex of antennal scape distinctly does not reach eye level or middle of head if eyes are absent (Pl. 1, Fig. 6; Pl. 2, Fig. 4; Pl. 3, Figs. 1, 2); petiole *usually* subquadrate (almost as wide as long or wider, dorsal view, Pl. 8, Figs. 9–12) ..... 10
10. Lamella in front of antennal fossa broad (Pl. 3, Fig. 1) . *leonardi* (11)
- Lamella in front of antennal fossa narrow or absent (Pl. 1, Fig. 6; Pl. 2, Fig. 4; Pl. 3, Fig. 2) ..... 11
11. Dorsal surface of propodeum distinctly longer than declining surface in profile (Pl. 6, Fig. 10); largest workers less than 3.5 mm long ..... *pauxillus* (11)
- Dorsal surface of propodeum not distinctly longer than declining surface in profile (Pl. 7, Figs. 1, 2); largest workers more than 4 mm long ..... 12
12. Petiole slightly longer than wide (dorsal view, Pl. 8, Fig. 11); anteroventral tooth of petiole acute (Pl. 7, Fig. 1); largest workers less than 4.5 mm long ..... *fallax* (11)
- Petiole slightly wider than long (dorsal view, Pl. 8, Fig. 12); anteroventral tooth of petiole absent or broadly triangular (Pl. 7, Fig. 2); largest worker more than 5.0 mm long ..... *spinolai*
13. Inner basal surface of mandible straight and forms a sharp angle or tooth at its juncture with masticatory surface (Pl. 2, Fig. 5); posterolateral corners of head without distinct teeth or projections (frontal view, Pl. 2, Fig. 5) ..... *rugulosus* (12)

- Inner basal surface of mandible gradually curves into masticatory surface without a distinct corner, and posterolateral corners of head projecting or with distinct teeth (Pl. 2, Figs. 6–9) ..... 14
- 14. Head and alitrunk with numerous large round pit-like depressions; color black to dark reddish brown ..... *sumichrasti* (12)
  - Head and alitrunk, although thickly granulated and sometimes rugated, without distinct round pit-like depressions; color usually reddish brown ..... 15
- 15. Posterolateral corners of head strongly projecting (Pl. 2, Fig. 7) ..... *cornutus* (13)
  - Posterolateral corners of head only moderately projecting or with small, slightly out-turned teeth (Pl. 2, Figs. 8, 9) ..... 16
- 16. Juncture of dorsal and declining surfaces of propodeum form a slightly angular corner in profile (Pl. 7, Fig. 6) ..... *texasus* (13)
  - Juncture of dorsal and declining surfaces of propodeum rounded in profile (Pl. 7, Fig. 7) ..... *nigrescens* (13)

## MALES

1. Lower border of clypeus with two distinct teeth (Pl. 9, Figs. 13, 15) ..... 2
  - Lower border of clypeus without two distinct teeth (Pl. 10, 11) . 3
2. Apex of subgenital plate with two teeth (Pl. 13, Fig. 3); stipes with a broad subapical dorsal projection and an apical hook-shaped tooth (Pl. 14, Fig. 11) ..... *klugi* (17)
  - Apex of subgenital plate with three teeth—two large outer apical teeth and one small median subapical tooth (Pl. 12, Fig. 9); stipes with a dorsal subapical notch and a blunt apex (Pl. 14, Fig. 12) ..... *guerini* (18)
3. Apex of subgenital plate with four teeth—two large outer apical teeth and two small inner subapical teeth (Pl. 13, Figs. 4, 5) ... 4
  - Apex of subgenital plate with three teeth—two large outer apical teeth and one small median subapical tooth (Pl. 12, Figs. 10–16; Pl. 13, Figs. 6–18) ..... 5
4. Distance from lateral ocellus to compound eye less than one-half diameter of median ocellus (Pl. 10, Fig. 1); median ocellus large (diameter about 0.44 mm); wings grayish yellow ..... *halidayi* (7)
  - Distance from lateral ocellus to compound eye about equal diameter of median ocellus (Pl. 10, Fig. 2); median ocellus medium sized (diameter about 0.28 mm); wings blackish ..... *spinolai*
5. Mandible distinctly sickle-shaped, i.e. curved inward and gradually tapered to a sharp apex (Pl. 10, Figs. 3–14) ..... 6
  - Mandible not distinctly sickle-shaped, but unevenly tapered with a slight to strong convexity along the middle of the inner surface



- (Pl. 10, Figs. 15, 17; Pl. 11, Figs. 2, 4, 5) *or* spatulate (Pl. 11, Figs. 7–12) ..... 15
6. Apex of sagitta elongated into a broad dorsal beak-like projection which extends well beyond the ventral apical projections (lateral view, Pl. 18, Figs. 5–9) ..... 7
- Apex of sagitta not forming a dorsal beak-like projection and not extending far beyond the ventral projections (lateral view, Pl. 17, Figs. 5–8) ..... 11
7. Volsella forked (Pl. 19, Figs. 1–3); length greater than 8 mm ... 8
- Volsella not forked (Pl. 18, Figs. 24, 25); length about 8 mm or less ..... 10
8. Distance from lateral ocellus to compound eye greater than diameter of median ocellus (Pl. 10, Fig. 4); apex of stipes distinctly truncated (Pl. 15, Fig. 1) ..... *spoliator* (17)
- Distance from lateral ocellus to compound eye less than diameter of median ocellus (Pl. 10, Figs. 5, 6); apex of stipes not distinctly truncated (Pl. 15, Figs. 2, 3) ..... 9
9. Head and wings black; distance from lateral ocellus to compound eye usually about one-half diameter of median ocellus (Pl. 10, Fig. 5) ..... *fuscipennis* (7)
- Head and wings reddish brown to yellowish brown; distance from lateral ocellus to compound eye usually about one-fourth (or less) the diameter of median ocellus (Pl. 10, Fig. 6) ... *macropterus* (15)
10. Stipes, in profile, narrowed and rounded apically (Pl. 15, Fig. 4); ventral projections of sagitta well developed (Pl. 18, Fig. 8) ..... *tristis* (16)
- Stipes, in profile, truncated and not narrowed apically (Pl. 15, Fig. 5); ventral projections of sagitta absent (Pl. 18, Fig. 9) ..... *melsheimeri* (15)
11. Distance from lateral ocellus to compound eye distinctly greater than diameter of median ocellus (Pl. 10, Fig. 10); upper border of head strongly elevated above compound eye and forms distinctly rounded corners between compound eye and lateral ocellus (frontal view, Pl. 10, Fig. 10); stipes (Pl. 15, Fig. 6) ..... *cloosae* (16)
- Distance from lateral ocellus to compound eye less than diameter of median ocellus, and upper border of head not distinctly elevated above compound eye and does not form a rounded corner between compound eye and lateral ocellus (frontal view, Pl. 10, Figs. 11–14) ..... 12
12. Front coxa about as wide as long (Pl. 9, Fig. 20); apex of stipes divided into a long rectangular dorsal process and a large triangular ventral process (Pl. 15, Fig. 7) ..... *andrei* (16)

- Front coxa longer than wide (Pl. 9, Fig. 19); apex of stipes not divided into distinct dorsal and ventral projections (Pl. 15, Figs. 8–10) ..... 13
- 13. Length greater than 10 mm; length of mandible greater than length of compound eye (Pl. 10, Fig. 3); dorsal border of stipes not forming a broad triangle and without a tall dorsal subapical projection (Pl. 15, Fig. 8) ..... *swainsoni* (14)
- Length less than 10 mm; length of mandible about equals height of compound eye (Pl. 10, Figs. 12–14); dorsal border of stipes broadly triangular *or* with a tall dorsal subapical projection (Pl. 15, Figs. 9, 10) ..... 14
- 14. Dorsal border of stipes with a tall apical or subapical projection (Pl. 15, Fig. 9); lateral ocellus almost touching compound eye (Pl. 10, Fig. 12) ..... *fumosus* (20)
- Dorsal border of stipes broadly triangular (Pl. 15, Fig. 10); lateral ocellus distinctly separated from compound eye (Pl. 10, Fig. 14) ..... *minor* (15)
- 15. Mandible with inner median border slightly to strongly convex and with apex bent inward (Pl. 10, Figs. 15, 17; Pl. 11, Figs. 2, 4, 5) ..... 16
- Mandible bent inward basally and spatulate distally, but without an inward bent apex (Pl. 11, Figs. 7–12) ..... 18
- 16. Occiput not concave in profile (Pl. 10, Figs. 16, 18) .... *inflatus* (17)
- Occiput distinctly concave in profile with upturned posterior margin (Pl. 11, Figs. 1, 3, 6) ..... 17
- 17. Length of antennal scape 1 mm or slightly longer (Pl. 11, Figs. 1, 2); mesopleuron with long setae; stipes with broad dorsal notch (Pl. 15, Fig. 12) ..... *longiscapus* (19)
- Length of antennal scape slightly shorter than 1 mm (Pl. 11, Figs. 3–6); mesopleuron usually with short pubescent setae; stipes without a distinct dorsal notch (Pl. 15, Figs. 14, 15) ..... *pilosus* (8)
- 18. Distance from lateral ocellus to compound eye about equal or less than diameter of median ocellus (Pl. 11, Figs. 7–9); alitrunk yellowish brown to reddish brown ..... 19
- Distance from lateral ocellus to compound eye at least two times diameter of median ocellus (Pl. 11, Figs. 10–12); alitrunk black . 21
- 19. Mandible moderately (about 135°) bent inward almost at its base and with almost straight inner surface beyond bend (Pl. 11, Fig. 7); posterodorsal surface of stipes without a prominent dorsal projection (Pl. 16, Fig. 1) ..... *harrisi* (7)
- Mandible strongly (about 90°–100°) bent inward about one-third its length from base and with a convex inner surface beyond bend

- (Pl. 11, Figs. 8, 9); posterodorsal surface of stipes with an acute angular or rounded dorsal projection (Pl. 16, Figs. 3, 4) ..... 20
20. Setae on antennal scape and legs short and appressed; posterodorsal corner of stipes with acute angular dorsal projection (Pl. 16, Fig. 4) ..... *diabolus* (19)
- Setae on antennal scape and legs long and erect; posterodorsal surface of stipes with rounded dorsal projection (Pl. 16, Fig. 3) ..... *angulimandibulatus* (20)
21. Head, alitrunk and gaster usually black to blackish brown; prominent transverse swelling present above antennal fossa (Pl. 11, Fig. 10); posterodorsal border of stipes with indistinct, low triangular projection (Pl. 16, Fig. 5) ..... *nigrescens* (13)
- Head and alitrunk black, gaster usually reddish brown; transverse swelling above antennal fossa weak to absent (Pl. 11, Figs. 11, 12); posterodorsal corner of stipes somewhat rounded (Pl. 16, Fig. 6) or with a prominent tall dorsal projection (Pl. 16, Fig. 2) ..... 22
22. Apex of stipes with a tall dorsal projection (Pl. 16, Fig. 2); length 11–13 mm ..... *texanus* (13)
- Apex of stipes without a dorsal projection (Pl. 16, Fig. 6); length 10–11 mm ..... *opacithorax* (10)

#### NOMAMYRMEX

##### WORKERS

1. Postoccipital sulcus present (Pl. 5, Figs. 7, 8); dorsum of petiole with longitudinal rugae ..... *esenbecki* (21)
- Postoccipital sulcus absent (Pl. 5, Fig. 9); dorsum of petiole without longitudinal rugae ..... *hartigi* (21)

##### MALES

1. Longitudinal rugae usually present on first gastric tergite; setae distinctly separated along midline of fifth gastric tergite (Pl. 9, Figs. 17, 18); width of blade of stipes about one-half its length (Pl. 14, Figs. 2, 3); apex of volsella blunt or tapered (Pl. 18, Figs. 17, 18) ..... *esenbecki* (21)
- Longitudinal rugae absent on first gastric tergite; setae not distinctly separated along midline of fifth gastric tergite (Pl. 9, Fig. 16); width of blade of stipes at least two-thirds its length (Pl. 14, Fig. 4); apex of volsella with an angular posteroventral projection (Pl. 18, Fig. 19) ..... *hartigi* (21)

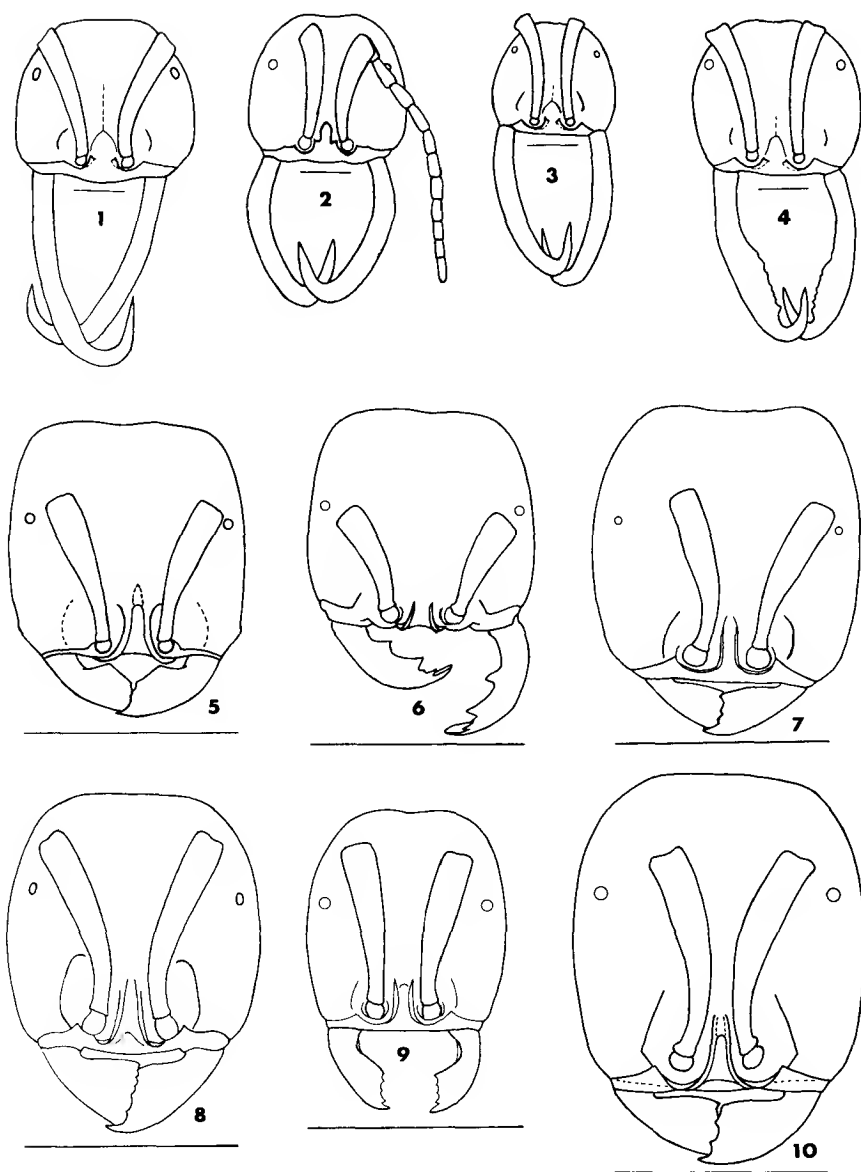


Plate 1. Figs. 1-10. Heads of major workers of (1) *Eciton burchelli parvispinum*, (2) *E. hamatum*, (3) *E. mexicanum*, (4) *E. vagans angustatum*, (5) *Neivamyrmex harrisi*, (6) *N. spinolai*, (7) *N. pilosus mexicanus*, (8) *N. melanocephalus*, (9) *N. graciellae*, (10) *N. impudens*. Lines are 1.0 mm.

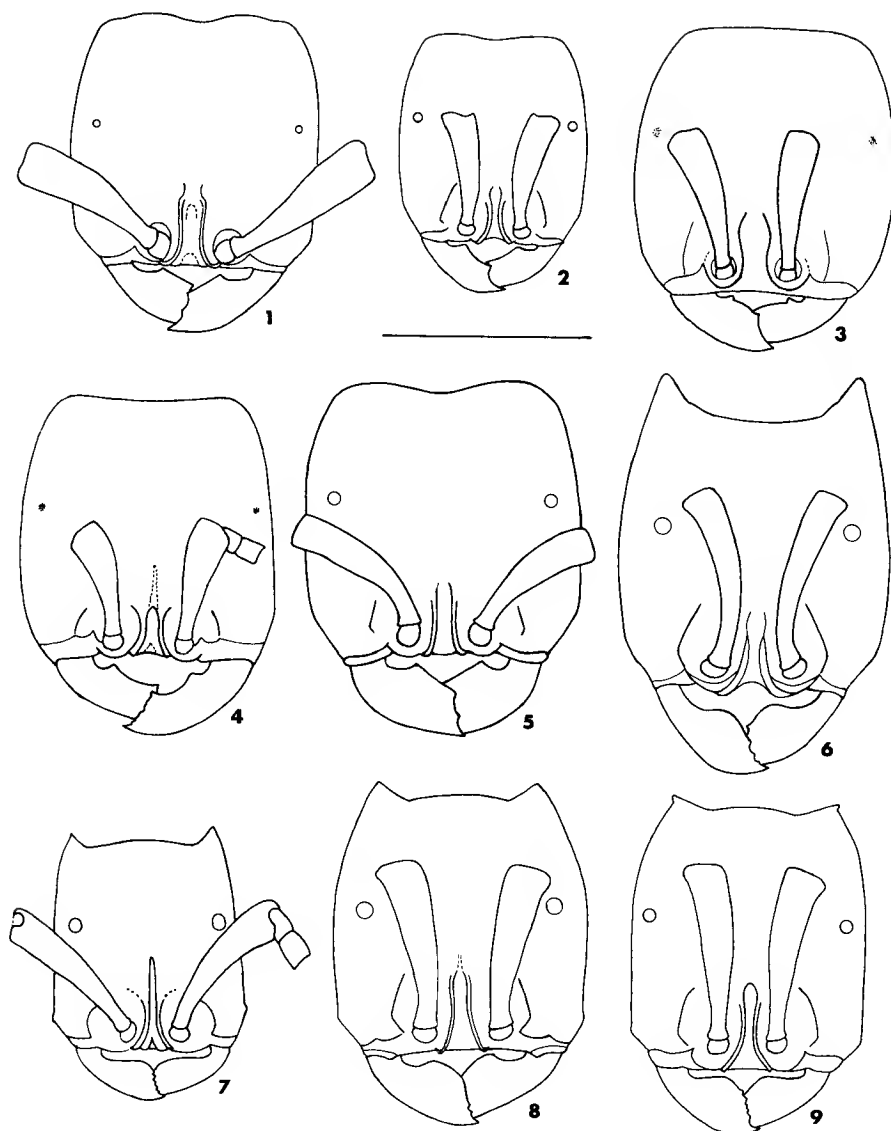


Plate 2. Figs. 1-9. Heads of workers of (1) *Neivamyrmex manni*, (2) *N. opacithorax*, (3) *N. agilis*, (4) *N. fallax*, (5) *N. rugulosus*, (6) *N. sumichrasti*, (7) *N. cornutus*, (8) *N. texanus*, (9) *N. nigrescens*. Line is 1.0 mm.

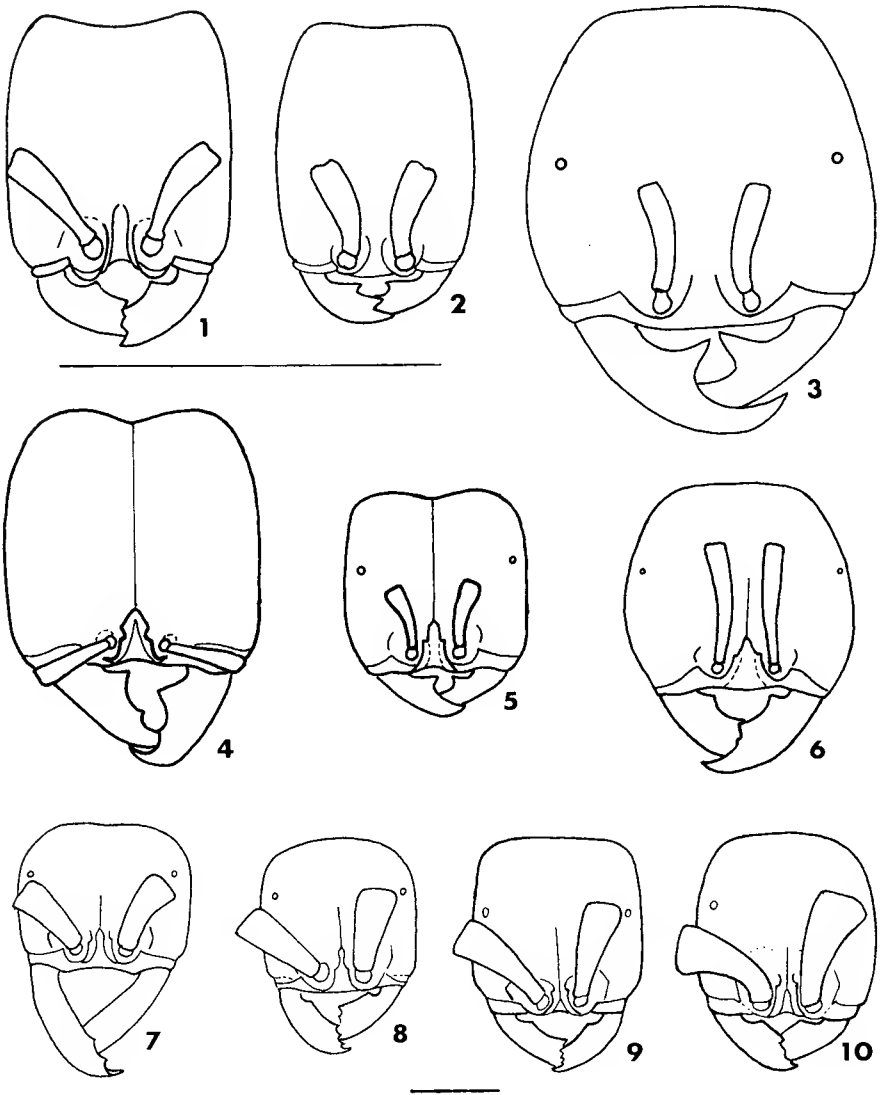


Plate 3. Figs. 1-10. Heads of workers of (1) *Neivamyrmex leonardi*, (2) *N. pauxillus*, (3) *Cheliomyrmex morosus*, (4) *Labidus coecus major*, (5) *L. coecus median*, (6) *L. praedator*, (7) *Nomamyrmex hartigi major*, (8) *Noma. hartigi median*, (9) *Noma. esenbecki wilsoni*, (10) *Noma. esenbecki mordax*. Lines are 1.0 mm.

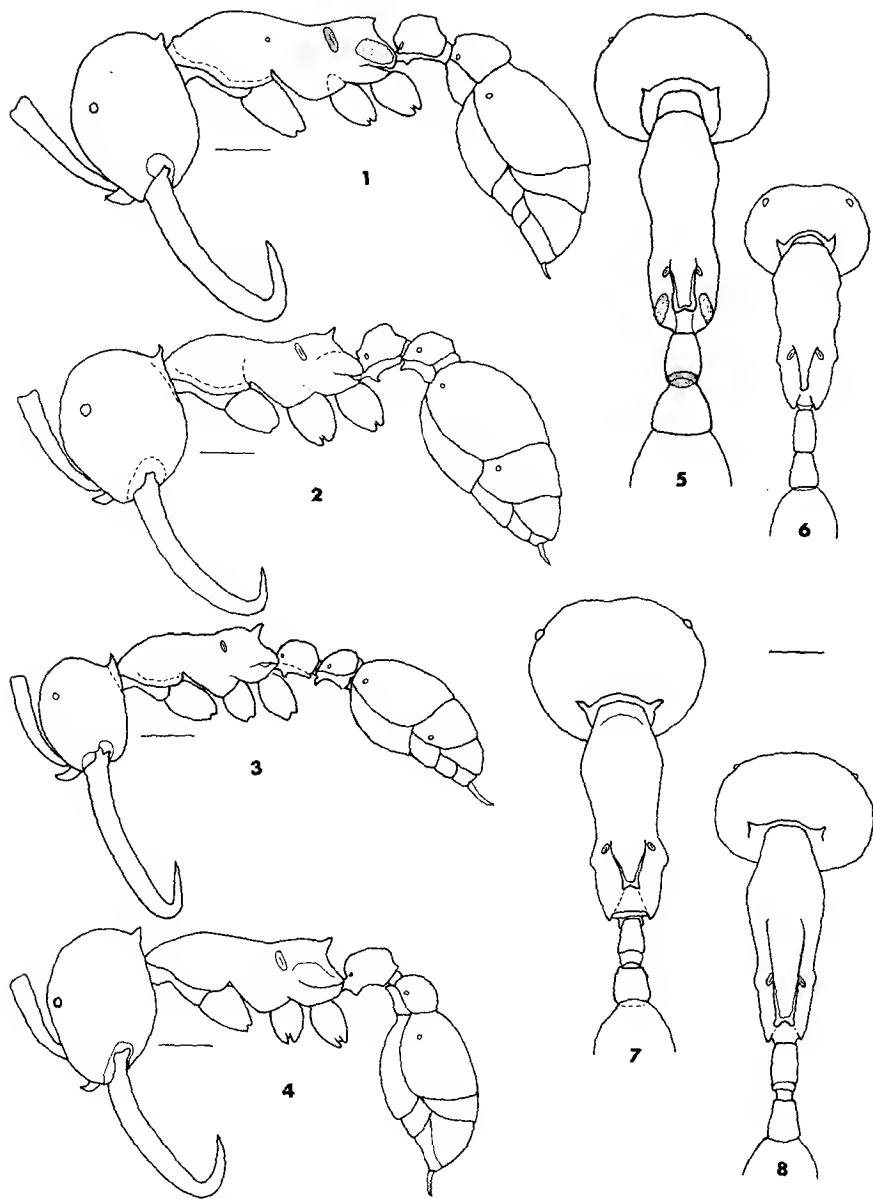


Plate 4. Figs. 1-8. 1-4. Lateral views of soldiers of (1) *Eciton burchelli parvispinum*, (2) *E. vagans angustatum*, (3) *E. mexicanum*, (4) *E. hamatum*. 5-8. Dorsal views of soldiers of (5) *E. burchelli parvispinum*, (6) *E. mexicanum*, (7) *E. vagans angustatum*, (8) *E. hamatum*. Lines are 1.0 mm.

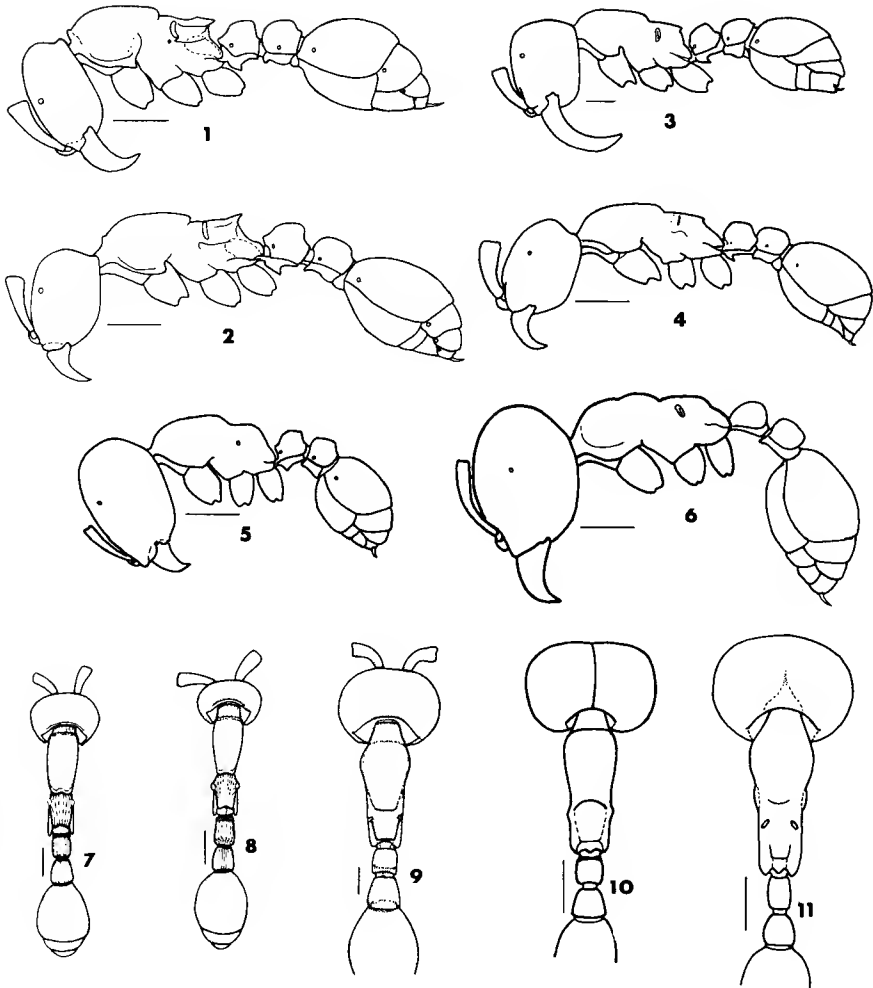


Plate 5. Figs. 1-11. 1-6. Lateral views of workers of (1) *Nomamyrmex esenbecki wilsoni*, (2) *Noma. esenbecki mordax*, (3) *Noma. hartigi major*, (4) *Noma. hartigi median*, (5) *Labidus coecus*, (6) *L. praedator*. 7-11. Dorsal views of workers of (7) *Noma. esenbecki wilsoni*, (8) *Noma. esenbecki mordax*, (9) *Noma. hartigi*, (10) *L. coecus*, (11) *L. praedator*. Lines are 1.0 mm.



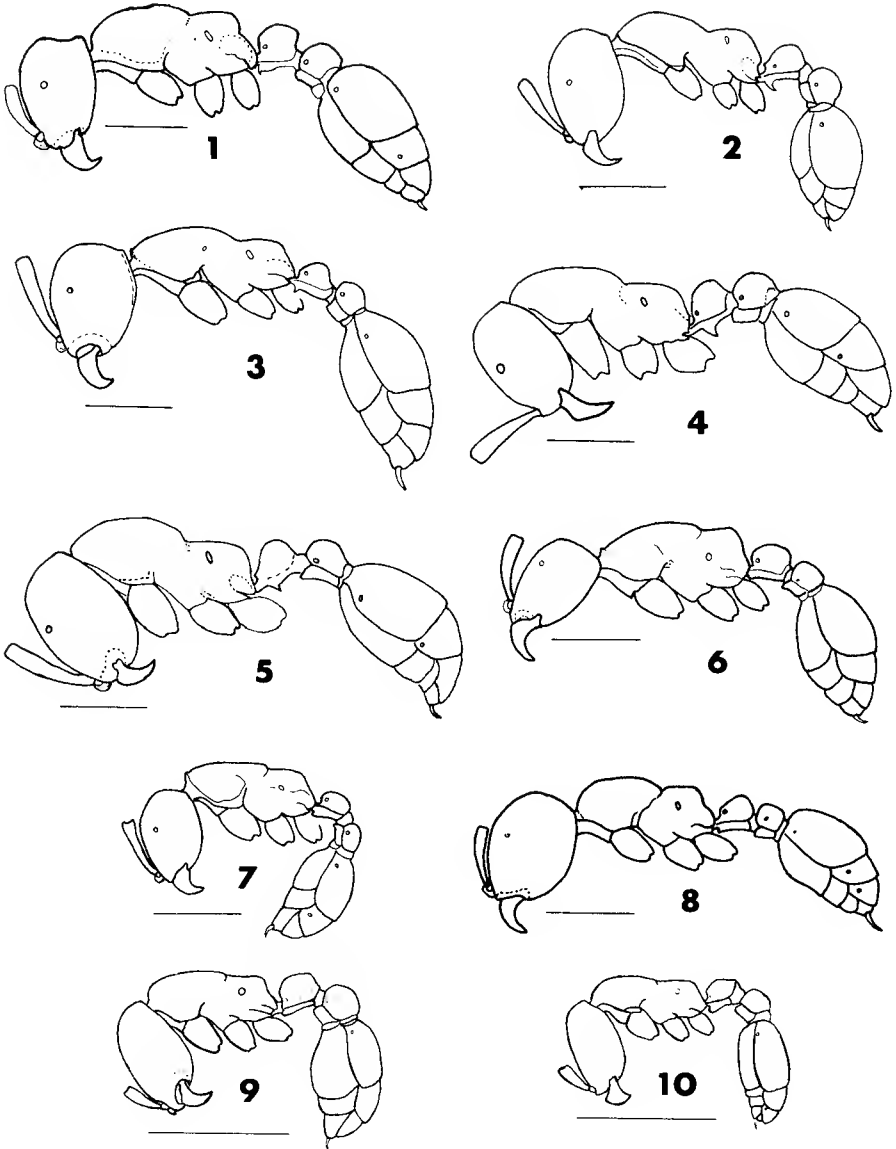


Plate 6. Figs. 1–10. Lateral views of workers of (1) *Neivamyrmex harrisi*, (2) *N. pilosus mexicanus*, (3) *N. melanocephalus*, (4) *N. graciellae*, (5) *N. impudens*, (6) *N. manni*, (7) *N. opacithorax*, (8) *N. agilis*, (9) *N. leonardi*, (10) *N. pauxillus*. Lines are 1.0 mm.

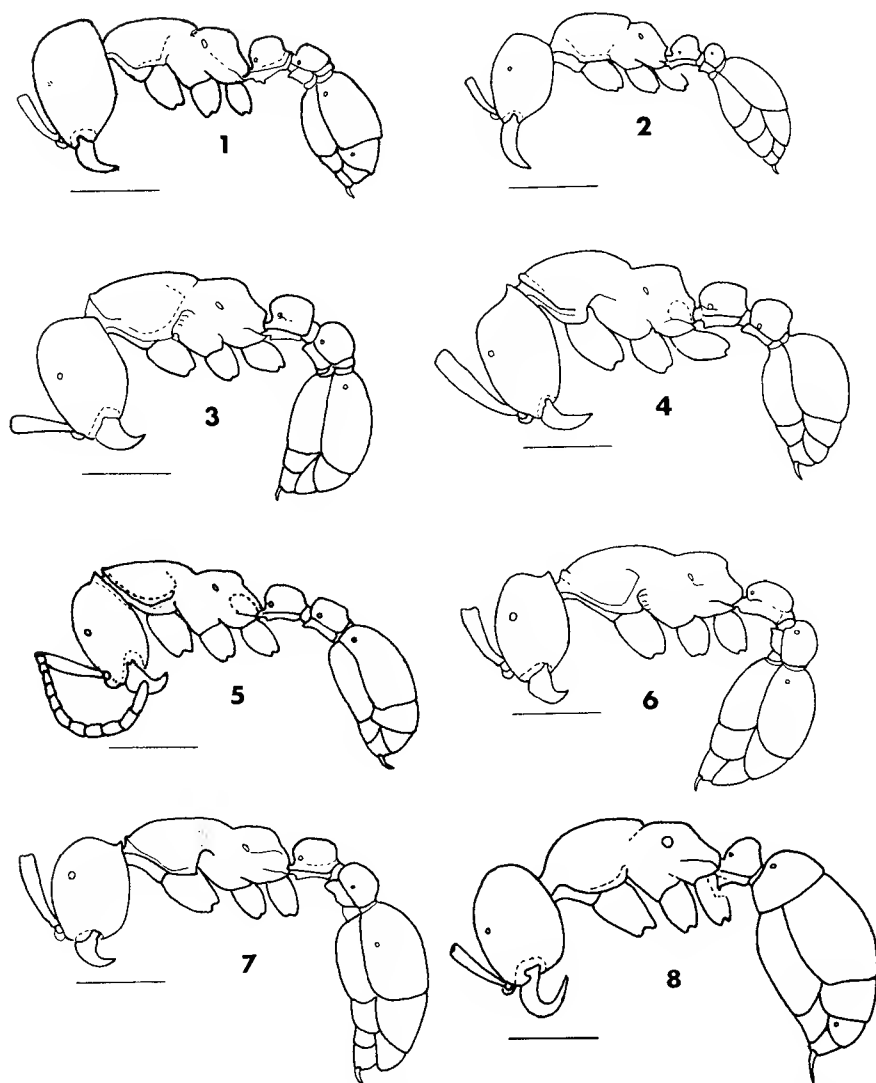


Plate 7. Figs. 1-8. Lateral views of workers of (1) *Neivamyrmex fallax*, (2) *N. spinolai*, (3) *N. rugulosus*, (4) *N. sumichrasti*, (5) *N. cornutus*, (6) *N. texanus*, (7) *N. nigrescens*, (8) *Cheliomyrmex morosus*. Lines are 1.0 mm.

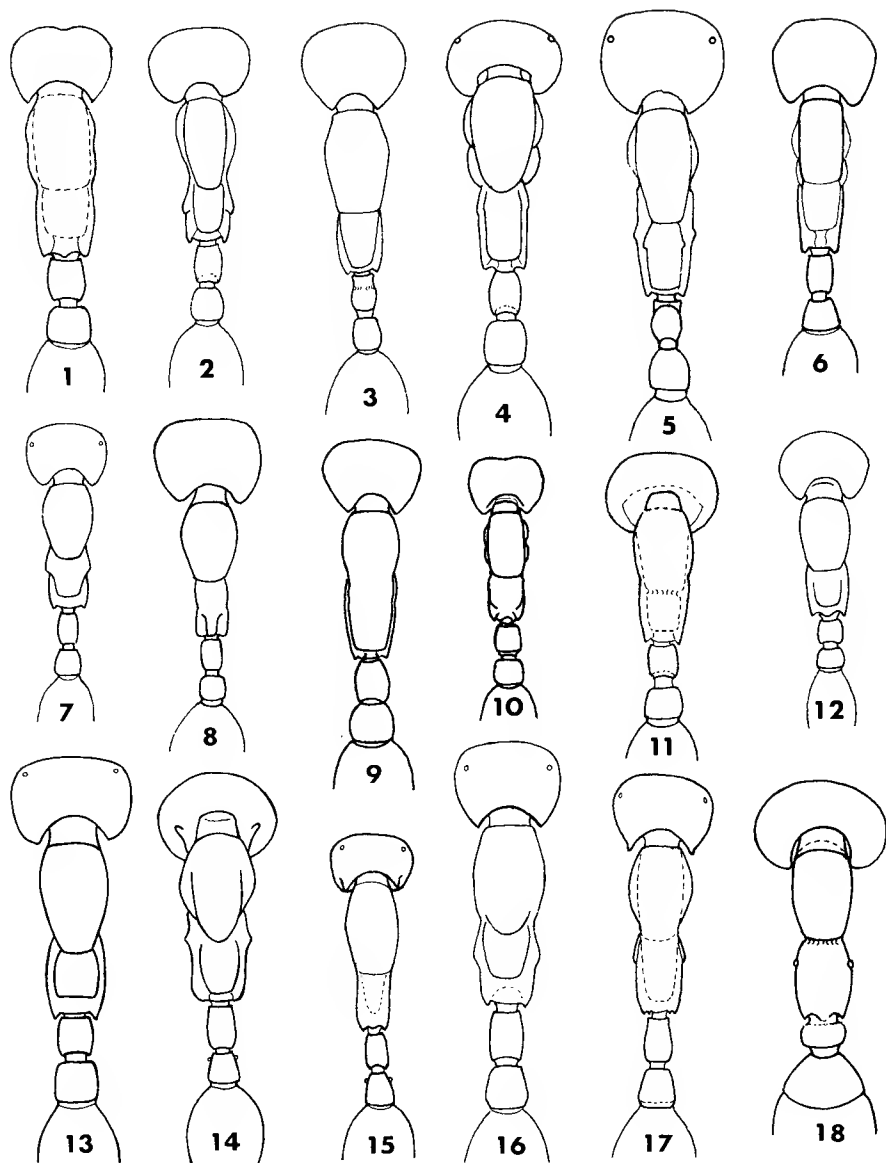


Plate 8. Figs. 1-18. Dorsal views of workers of (1) *Neivamyrmex harrisi*, (2) *N. pilosus mexicanus*, (3) *N. melanocephalus*, (4) *N. graciellae*, (5) *N. impudens*, (6) *N. manni*, (7) *N. opacithorax*, (8) *N. agilis*, (9) *N. leonardi*, (10) *N. pauxillus*, (11) *N. fallax*, (12) *N. spinolai*, (13) *N. rugulosus*, (14) *N. sumichrasti*, (15) *N. cornutus*, (16) *N. texanus*, (17) *N. nigrescens*, (18) *Cheliomyrmex morosus*.

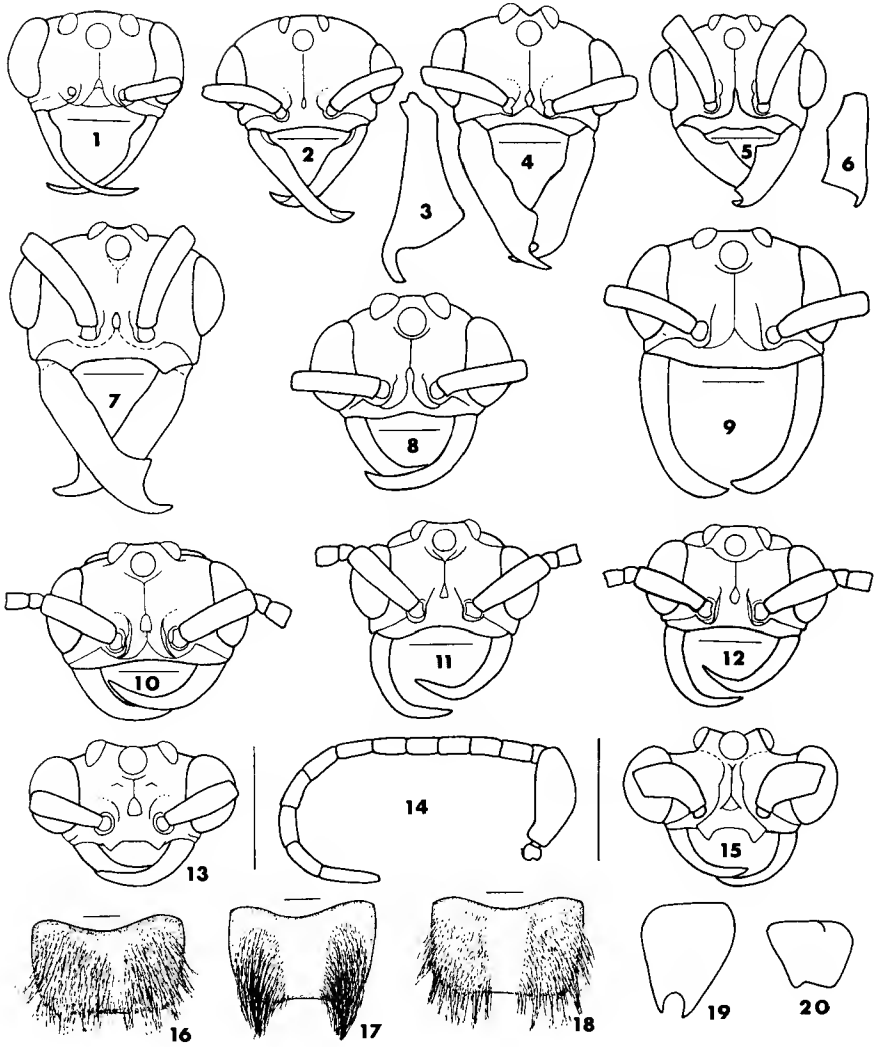


Plate 9. Figs. 1-20. 1, 2, 4, 5, 7-13, 15. Heads of males of (1) *Cheliomyrmex morosus*, (2) *Eciton burchelli parvispinum*, (4) *E. mexicanum*, (5) *E. hamatum*, (7) *E. vagans angustatum*, (8) *Labidus coecus*, (9) *L. praedator*, (10) *Nomamyrmex hartigi*, (11) *Noma. esenbecki wilsoni*, (12) *Noma. esenbecki mordax*, (13) *Neivamyrmex klugi distans*, (15) *N. guerini*. 3, 6. Mandibles of males of (3) *E. mexicanum*, (6) *E. hamatum*. 14. Antenna of male of *N. guerini*. 16-18. Dorsal views of fifth tergites of males of (16) *Noma. hartigi*, (17) *Noma. esenbecki wilsoni*, (18) *Noma. esenbecki mordax*. 19, 20. Procoxae of males of (19) *N. swainsoni*, (20) *N. andrei*. Lines are 1.0 mm.

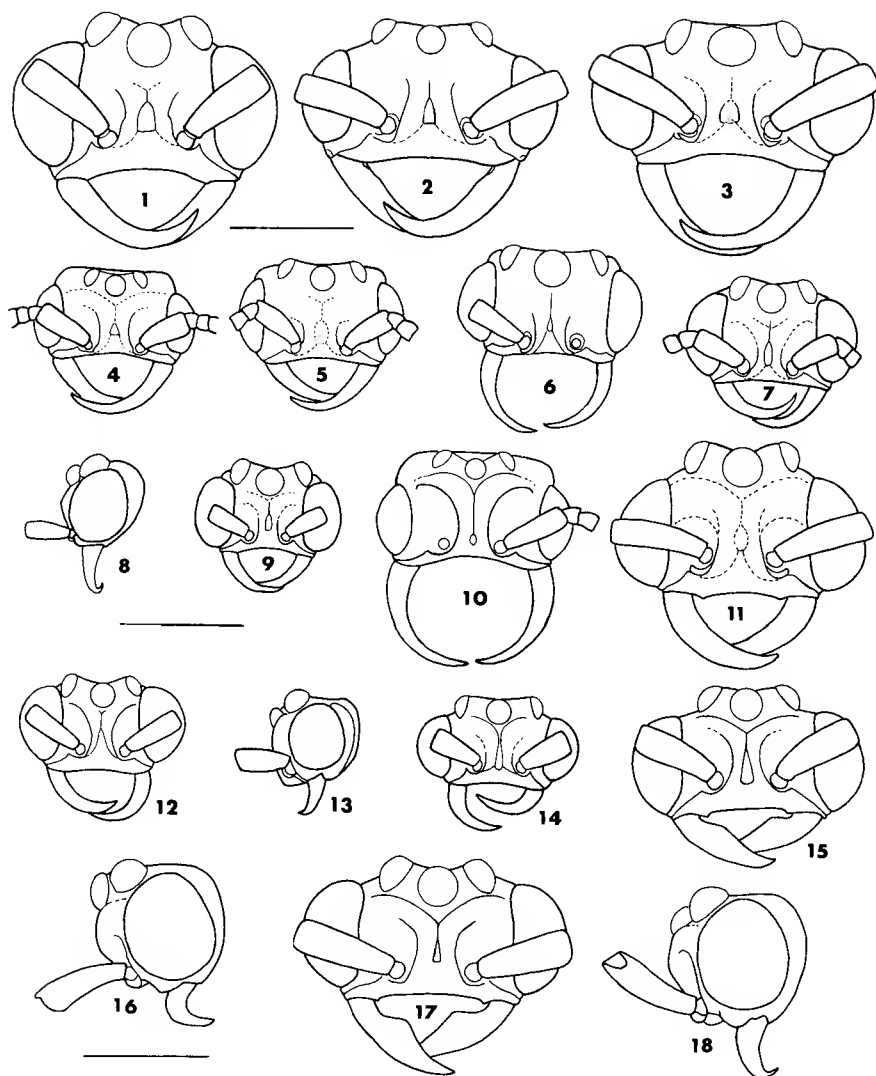


Plate 10. Figs. 1–18. Heads of males of (1) *Neivamyrmex halidayi*, (2) *N. spinolai*, (3) *N. swainsoni*, (4) *N. spoliator*, (5) *N. fuscipennis*, (6) *N. macropterus*, (7) *N. tristis*, (8, 9) *N. melsheimeri*, (10) *N. cloosae*, (11) *N. andrei*, (12) *N. fumosus*, (13, 14) *N. minor*, (15, 16) *N. inflatus* from Yucatan, (17, 18) *N. inflatus* from Nayarit. Lines are 1.0 mm.

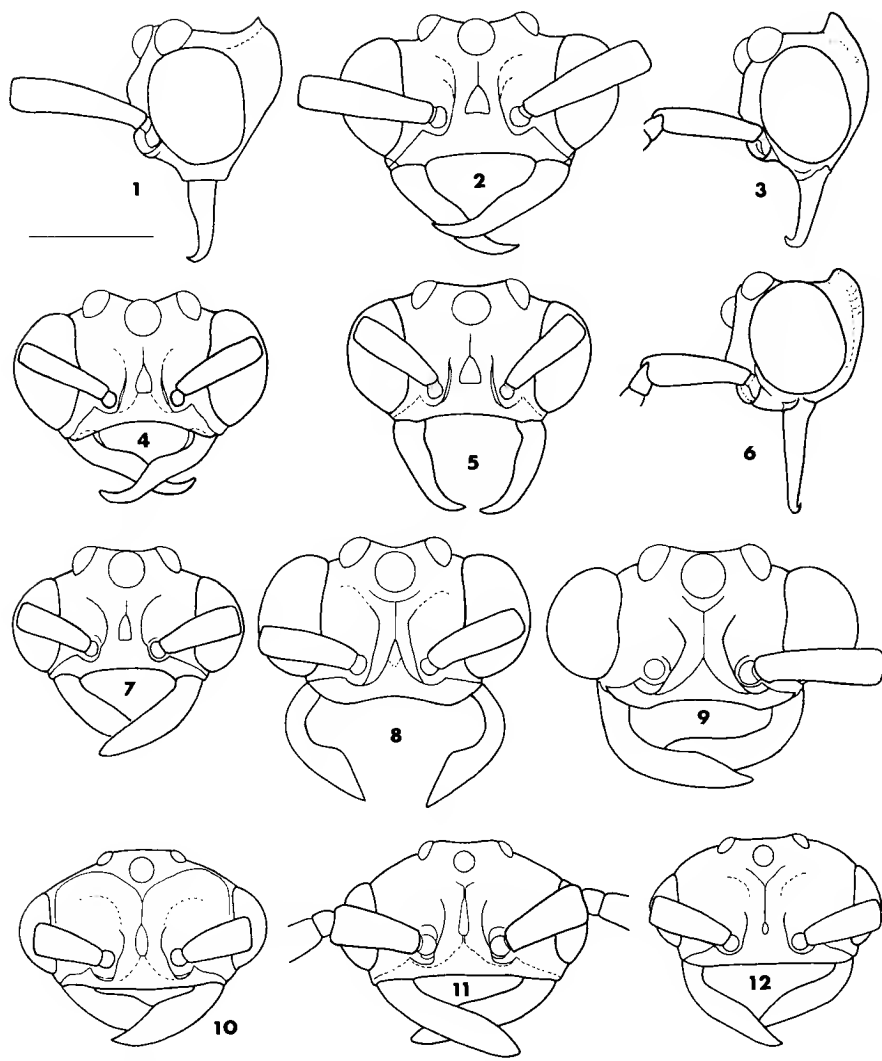


Plate 11. Figs. 1-12. Heads of males of (1, 2) *Neivamyrmex longiscapus*, (3, 4) *N. pilosus mexicanus*, (5, 6) *N. pilosus mandibularis*, (7) *N. harrisi*, (8) *N. diabolus*, (9) *N. angulimandibulatus*, (10) *N. nigrescens*, (11) *N. texanus*, (12) *N. opacithorax*. Lines are 1.0 mm.

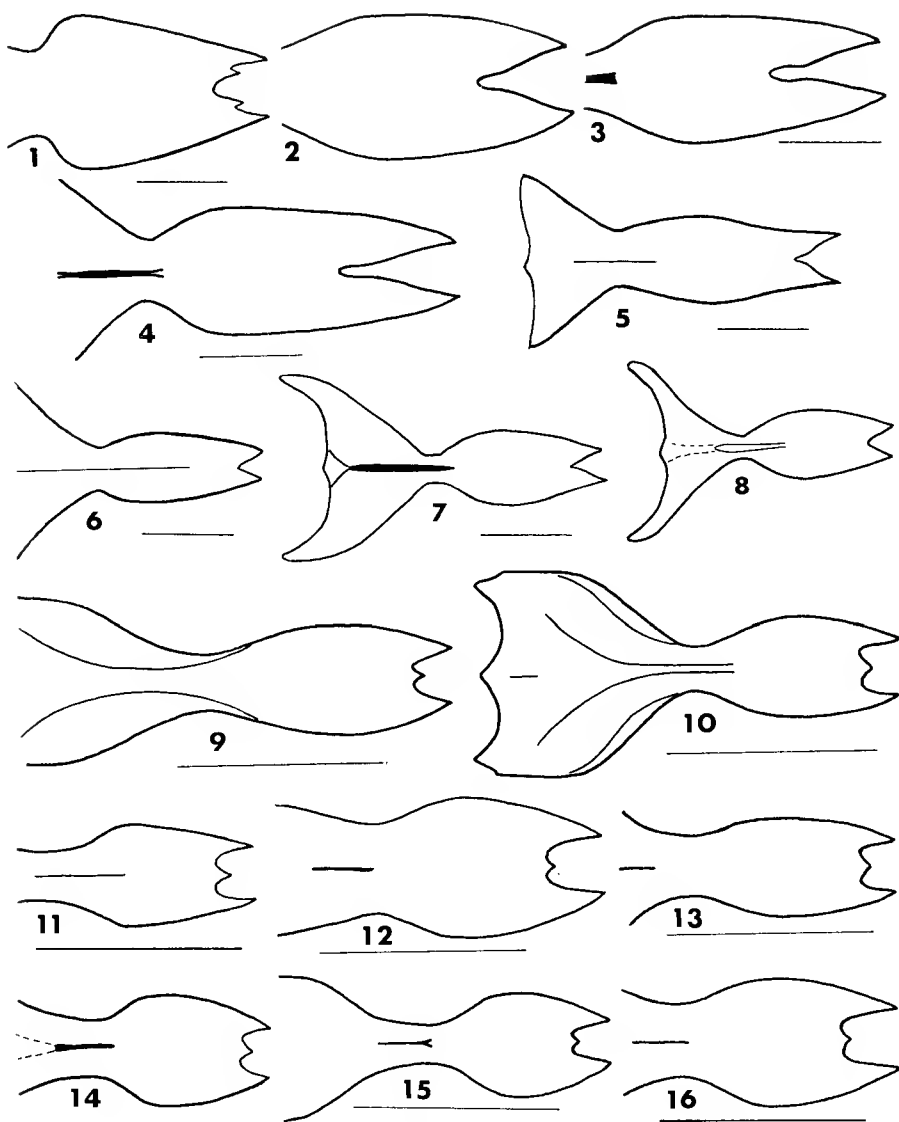


Plate 12. Figs. 1-16. Subgenital plates of males of (1) *Cheliomyrmex morosus*, (2) *Noma-  
myrmex esenbecki mordax*, (3) *Noma. esenbecki wilsoni*, (4) *Noma. hartigi*, (5) *Eciton hama-  
tum*, (6) *E. burchelli parvispinum*, (7) *E. mexicanum*, (8) *E. vagans angustatum*, (9) *Neiva-  
myrmex guerini*, (10) *N. fumosus*, (11) *N. spoliator*, (12) *N. fuscipennis*, (13) *N. minor*, (14) *N.  
tristis*, (15) *N. melsheimeri*, (16) *N. macropterus*. Lines are 1.0 mm.

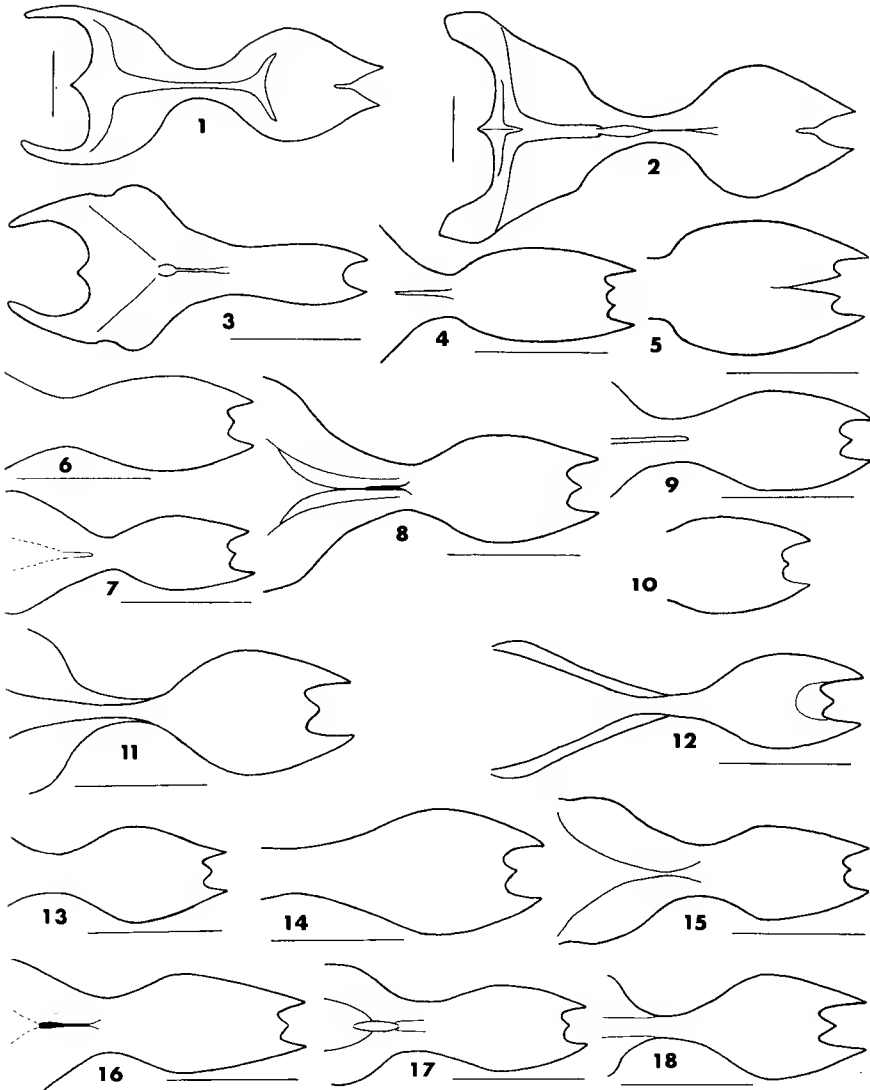


Plate 13. Figs. 1-18. Subgenital plates of males of (1) *Labidus coecus*, (2) *L. praedator*, (3) *Neivamyrmex klugi distans*, (4) *N. halidayi*, (5) *N. spinolai*, (6) *N. andrei*, (7) *N. harrisi*, (8) *N. swainsoni*, (9) *N. inflatus* from Yucatan, (10) *N. inflatus* from Nayarit, (11) *N. longiscapus*, (12) *N. pilosus mexicanus*, (13) *N. diabolus*, (14) *N. angulimandibulatus*, (15) *N. nigrescens*, (16) *N. texanus*, (17) *N. opacithorax*, (18) *N. pilosus mandibularis*. Lines are 1.0 mm.



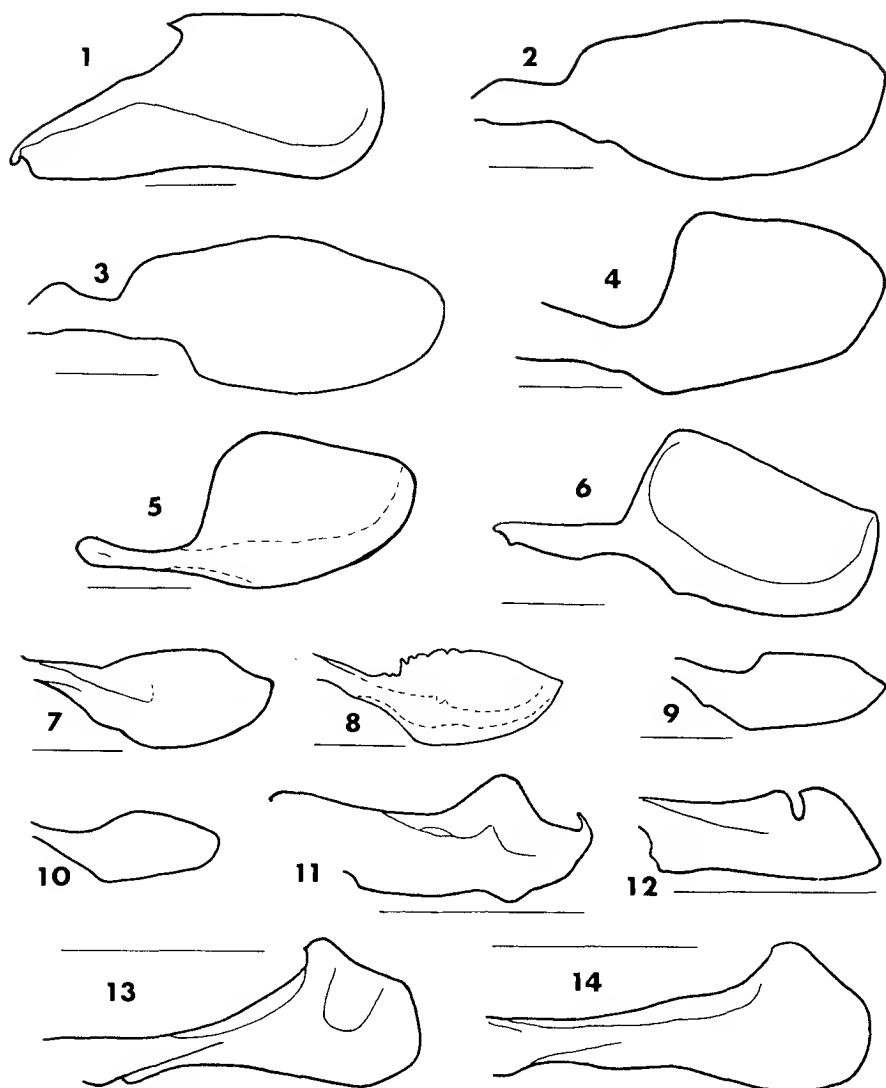


Plate 14. Figs. 1-14. Stipites of males of (1) *Cheliomyrmex morosus*, (2) *Nomamyrmex esenbecki wilsoni*, (3) *Noma. esenbecki mordax*, (4) *Noma. hartigi*, (5) *Labidus coecus*, (6) *L. praedator*, (7) *Eciton burchelli parvispinum*, (8) *E. mexicanum*, (9) *E. hamatum*, (10) *E. vagans angustatum*, (11) *Neivamyrmex klugi distans*, (12) *N. guerini*, (13) *N. halidayi*, (14) *N. spinolai*. Lines are 1.0 mm.

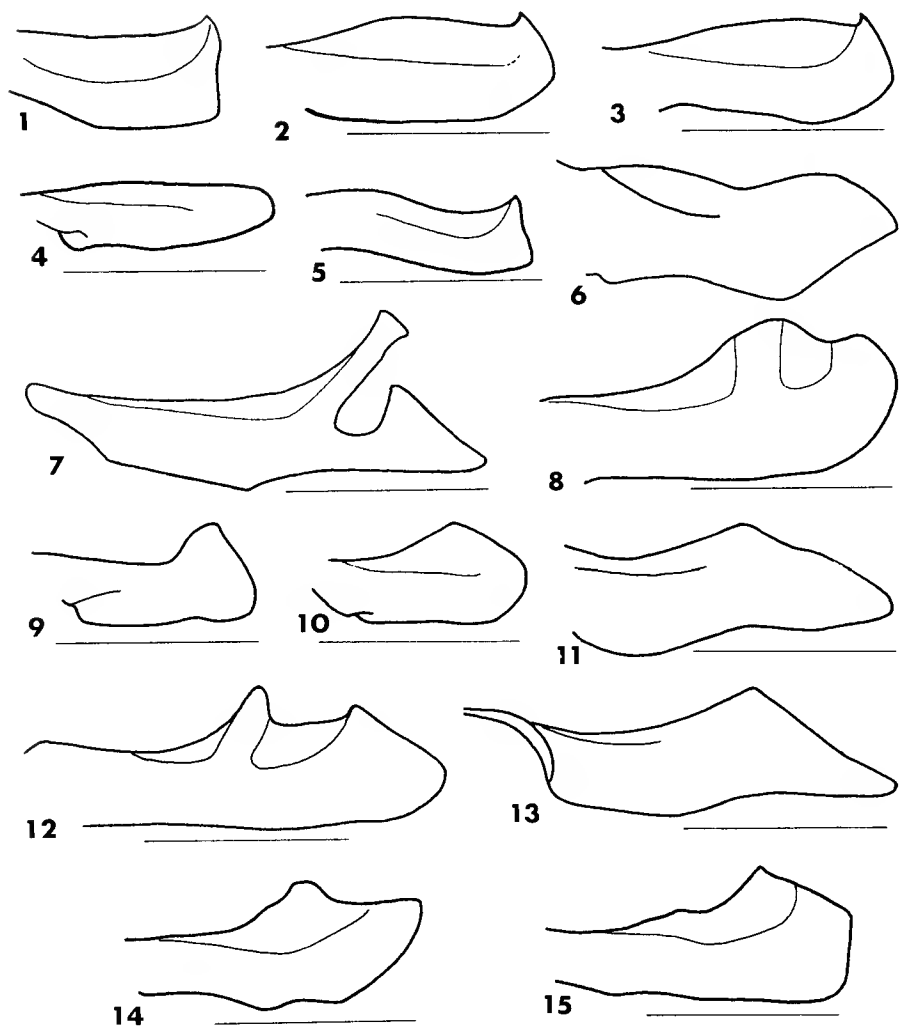


Plate 15. Figs. 1-15. Stipites of males of (1) *Neivamyrmex spoliator*, (2) *N. fuscipennis*, (3) *N. macropterus*, (4) *N. tristis*, (5) *N. melsheimeri*, (6) *N. cloosae*, (7) *N. andrei*, (8) *N. swainsoni*, (9) *N. fumosus*, (10) *N. minor*, (11) *N. inflatus* from Yucatan, (12) *N. longiscapus*, (13) *N. inflatus* from Nayarit, (14) *N. pilosus mexicanus*, (15) *N. pilosus mandibularis*. Lines are 1.0 mm.

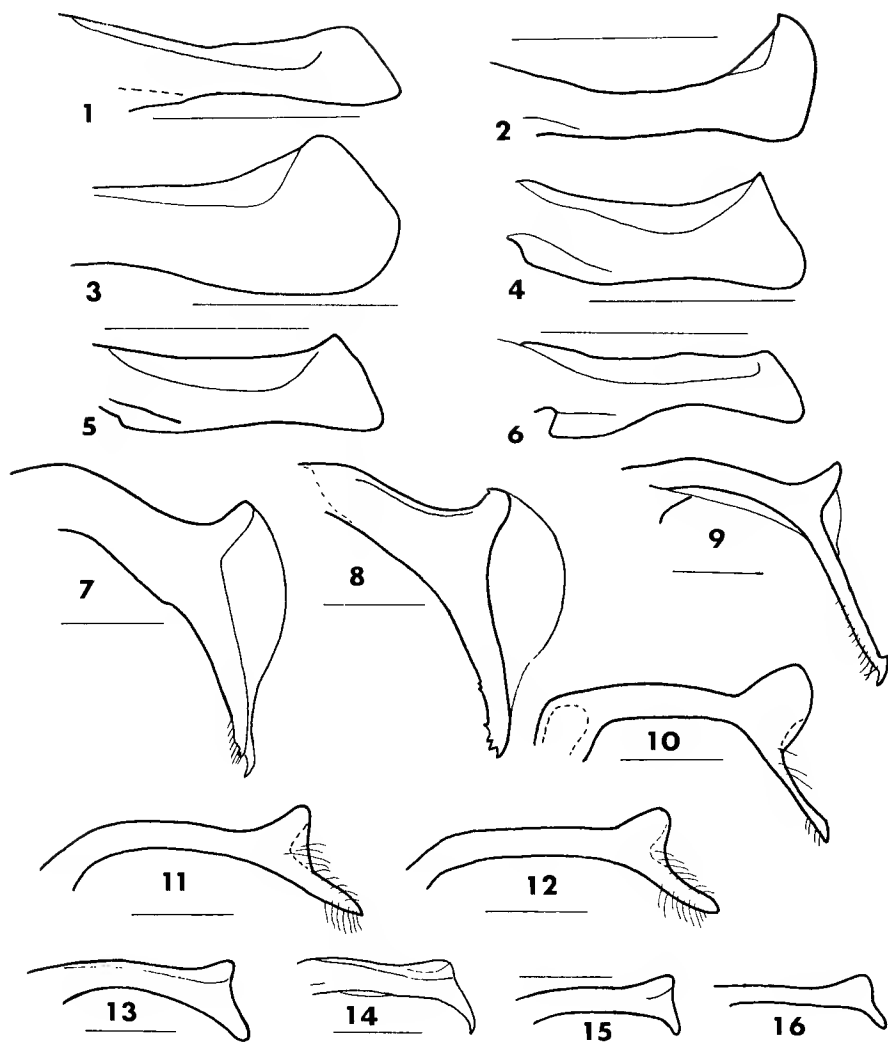


Plate 16. Figs. 1-16. 1-6. Stipites of males of (1) *Neivamyrmex harrisi*, (2) *N. texanus*, (3) *N. angulimandibulatus*, (4) *N. diabolus*, (5) *N. nigrescens*, (6) *N. opacithorax*. 7-16: Sagittae of males of (7) *Labidus praedator*, (8) *L. coecus*, (9) *Cheliomyrmex morosus*, (10) *Nomamyrmex hartigi*, (11) *Noma. esenbecki wilsoni*, (12) *Noma. esenbecki mordax*, (13) *Eciton burchelli parvispinum*, (14) *E. mexicanum*, (15) *E. hamatum*, (16) *E. vagans angustatum*. Lines are 1.0 mm.

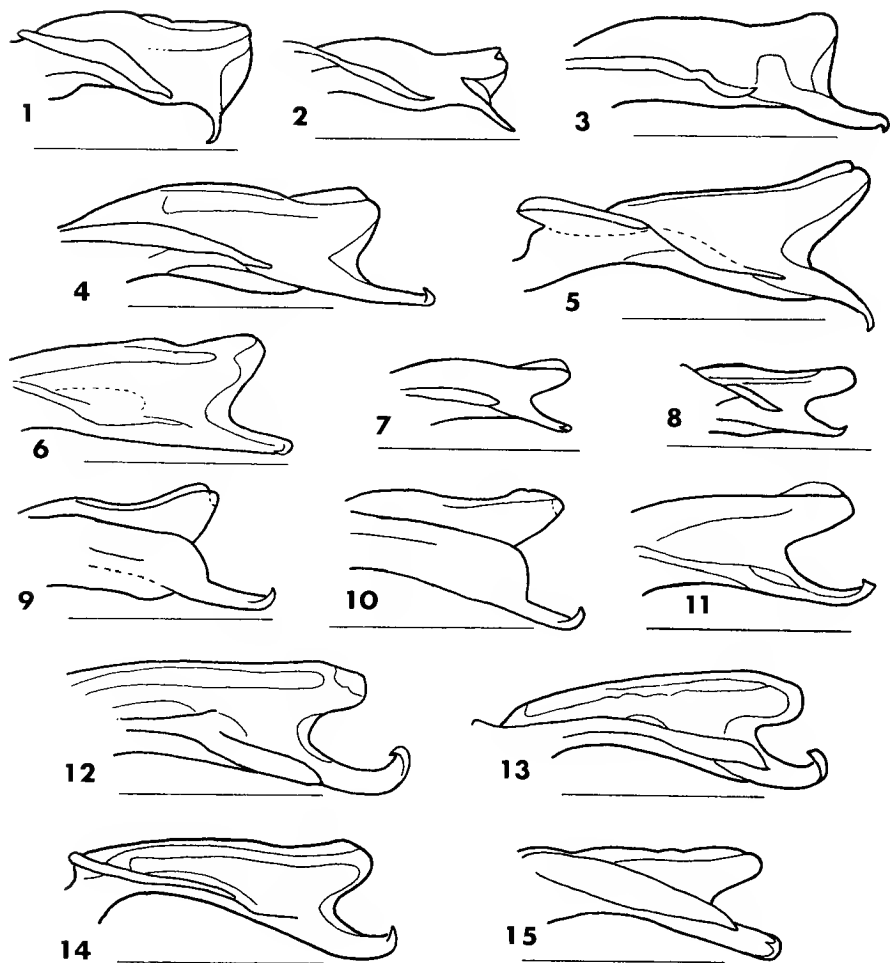


Plate 17. Figs. 1-15. Sagittae of males of (1) *Neivamyrmex klugi distans*, (2) *N. guerini*, (3) *N. halidayi*, (4) *N. spinolai*, (5) *N. swainsoni*, (6) *N. andrei*, (7) *N. fumosus*, (8) *N. minor*, (9) *N. inflatus* from Yucatan, (10) *N. inflatus* from Nayarit, (11) *N. diabolus*, (12) *N. longiscapus*, (13) *N. pilosus mexicanus*, (14) *N. pilosus mandibularis*, (15) *N. harrisi*. Lines are 1.0 mm.

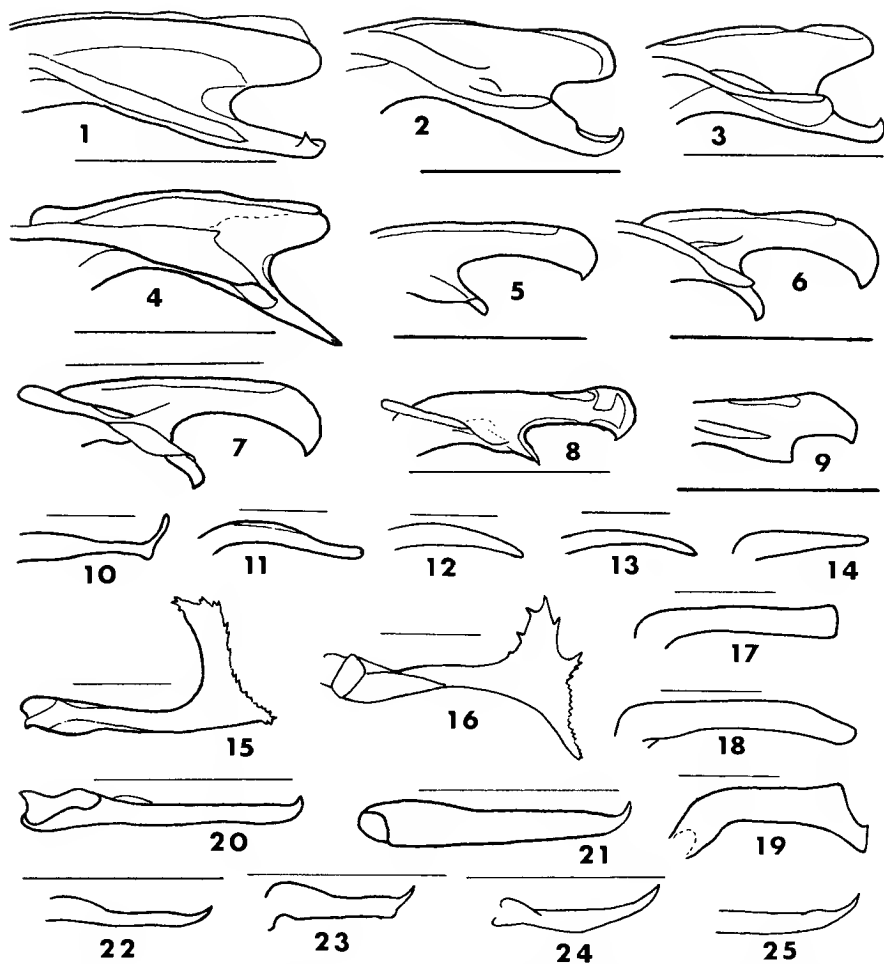


Plate 18. Figs. 1-25. 1-9. Sagittae of males of (1) *Neivamyrmex angulimandibulatus*, (2) *N. nigrescens*, (3) *N. opacithorax*, (4) *N. texanus*, (5) *N. spoliator*, (6) *N. macropterus*, (7) *N. fuscipennis*, (8) *N. tristis*, (9) *N. melsheimeri*. 10-25. Volsellae of males of (10) *Cheliomyrmex morosus*, (11) *Eciton burchelli parvispinum*, (12) *E. mexicanum*, (13) *E. hamatum*, (14) *E. vagans angustatum*, (15) *Labidus coecus*, (16) *L. praedator*, (17) *Nomamyrmex esenbecki wilsoni*, (18) *Noma. esenbecki mordax*, (19) *Noma. hartigi*, (20) *N. halidayi*, (21) *N. spinolai*, (22) *N. guerini*, (23) *N. klugi distans*, (24) *N. tristis*, (25) *N. melsheimeri*. Lines are 1.0 mm.

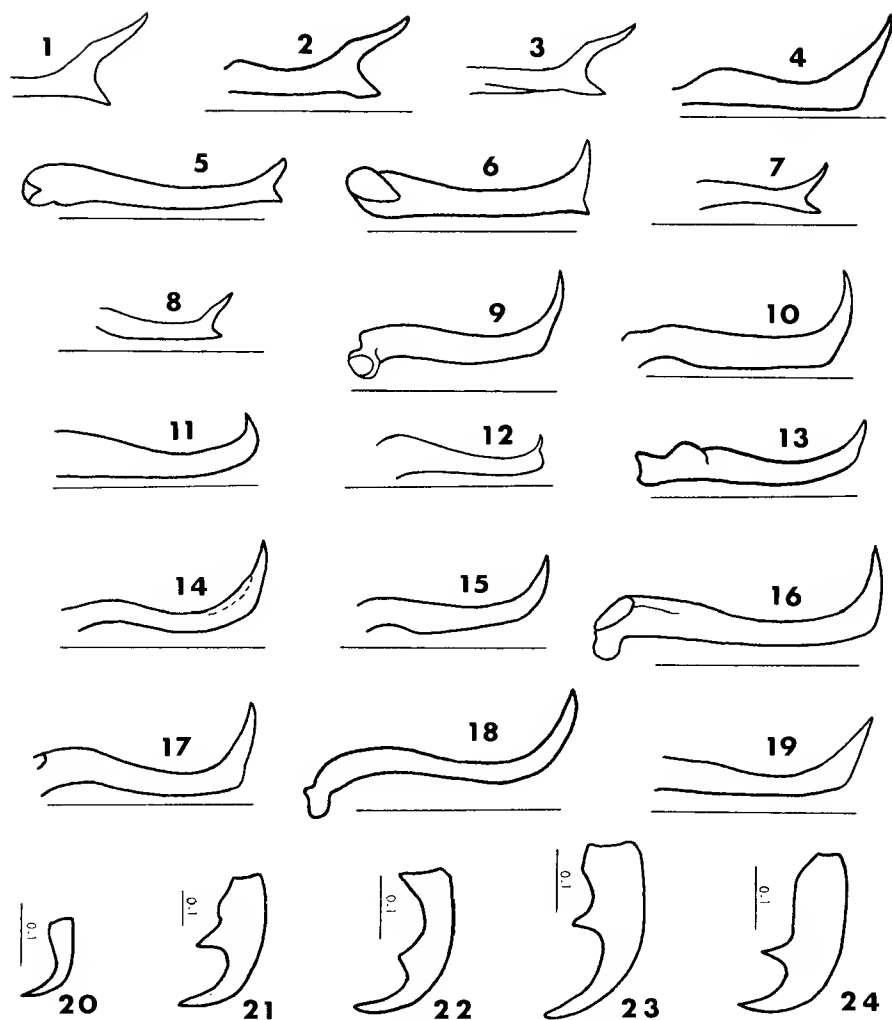


Plate 19. Figs. 1-24. 1-19 (lines are 1.0 mm). Volsellae of males of (1) *Neivamyrmex spoliator*, (2) *N. fuscipennis*, (3) *N. macropterus*, (4) *N. cloosae*, (5) *N. andrei*, (6) *N. swainsoni*, (7) *N. fumosus*, (8) *N. minor*, (9) *N. inflatus* from Yucatan, (10) *N. inflatus* from Nayarit, (11) *N. longiscapus*, (12) *N. pilosus mexicanus*, (13) *N. pilosus mandibularis*, (14) *N. harrisi*, (15) *N. diabolus*, (16) *N. angulimandibulatus*, (17) *N. nigrescens*, (18) *N. texanus*, (19) *N. opacithorax*. 20-24 (lines are 0.1 mm). Claws of workers of (20) *N. pilosus*, (21) *Eciton burchelli*, (22) *Labidus praedator*, (23) *Nomamyrmex esenbecki mordax*, (24) *Cheliomyrmex morosus*.

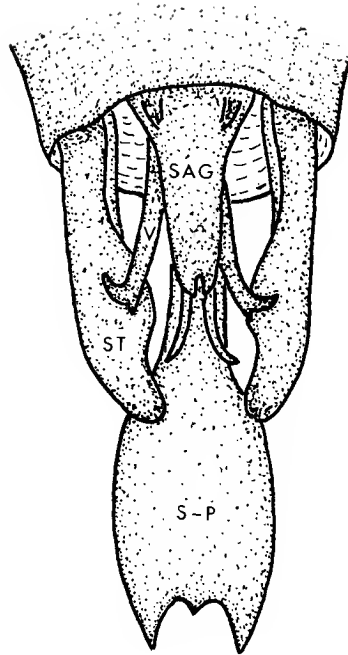


Plate 20. Genitalia of male of *Neivamyrmex swainsoni* with apical gastric segments removed. SAG = sagitta, V = volsella, ST = stipes, S-P = subgenital plate.

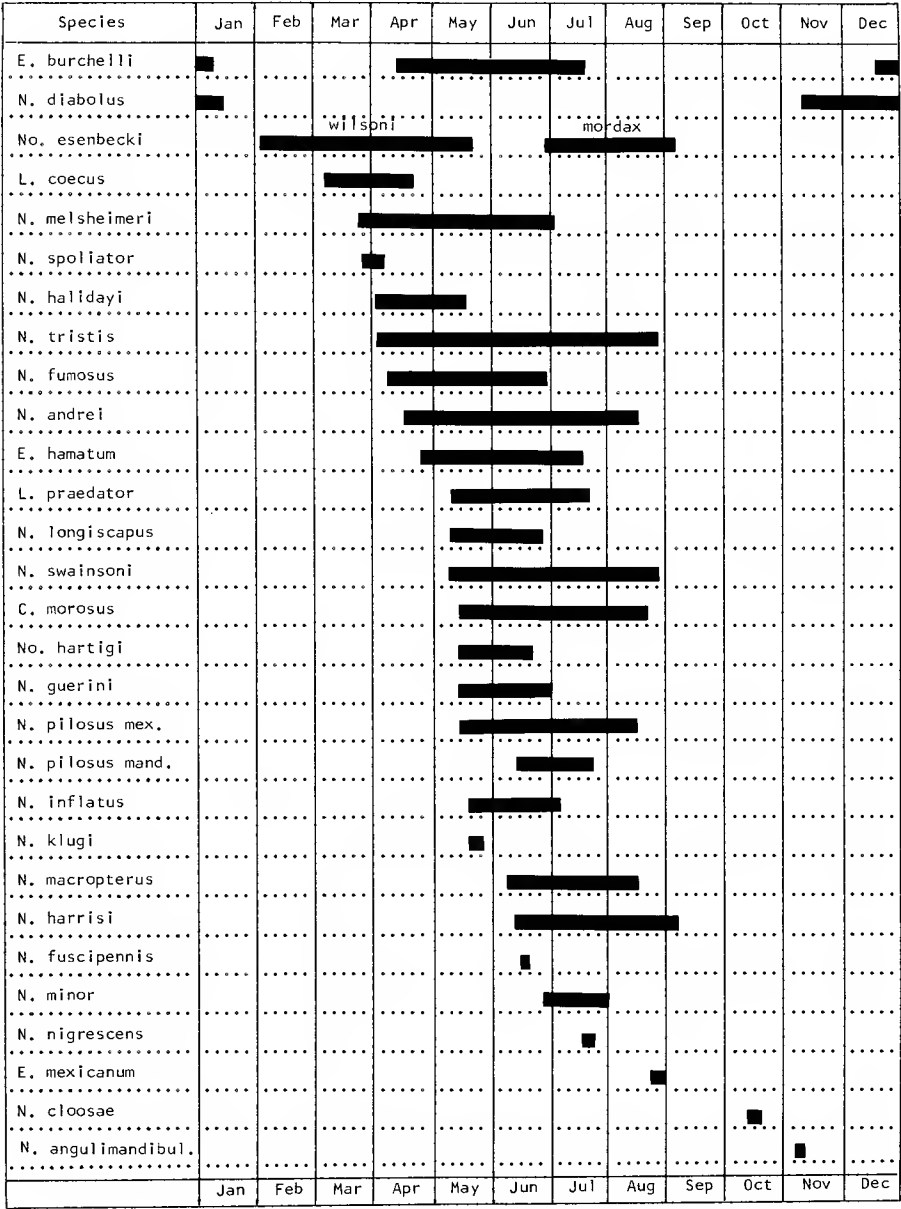


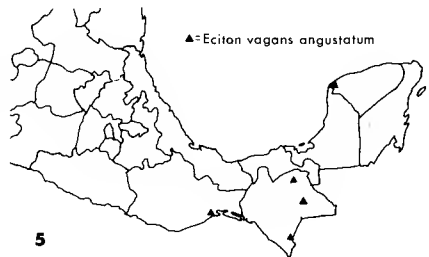
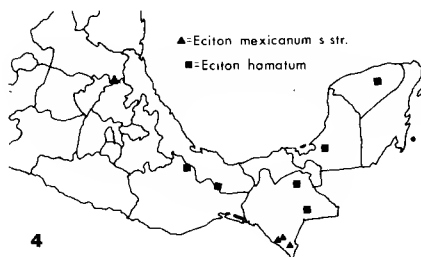
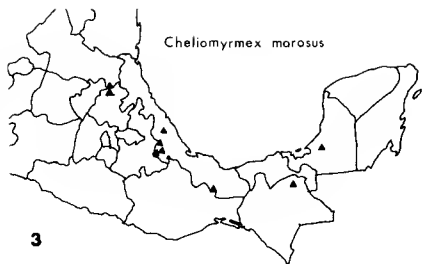
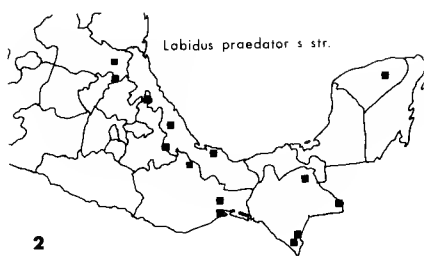
Plate 21. Flight periods of male army ants in Mexico (based on collection records). No data on male flights in Mexico was found for *E. vagans angustatum*, *N. spinolai*, *N. opacithorax*, and *N. texanus*; however, males of these species have been collected from other countries as follows: *E. vagans angustatum* (Costa Rica, Nov.), *N. spinolai* (Argentina & Brazil, Sept.-Dec.), *N. opacithorax* (U.S.A., Sept.-Dec.), *N. texanus* (U.S.A., Sept.-Nov.).



Index to Distribution Maps  
(map numbers in parentheses)

- |                                     |   |
|-------------------------------------|---|
| <i>Cheliomyrmex</i>                 | <i>N. inflatus</i> (17)                     |
| <i>C. morosus</i> (3)               | <i>N. klugi distans</i> (17)                |
| <i>Eciton</i>                       | <i>N. leonardi</i> (11)                     |
| <i>E. burchelli parvispinum</i> (6) | <i>N. longiscapus</i> (19)                  |
| <i>E. hamatum</i> (4)               | <i>N. macropterus</i> (15)                  |
| <i>E. mexicanum</i> s. str.(4)      | <i>N. manni</i> (10)                        |
| <i>E. vagans angustatum</i> (5)     | <i>N. melanocephalus</i> (9)                |
| <i>Labidus</i>                      | <i>N. melsheimeri</i> (15)                  |
| <i>L. coecus</i> (1)                | <i>N. minor</i> (15)                        |
| <i>L. praedator</i> s. str.(2)      | <i>N. nigrescens</i> (13)                   |
| <i>Neivamyrmex</i>                  | <i>N. opacithorax</i> (10)                  |
| <i>N. agilis</i> (10)               | <i>N. pauxillus</i> (11)                    |
| <i>N. andrei</i> (16)               | <i>N. pilosus mandibularis</i> (8)          |
| <i>N. angulimandibulatus</i> (20)   | <i>N. pilosus mexicanus</i> (8)             |
| <i>N. cloosae</i> (16)              | <i>N. rugulosus</i> (12)                    |
| <i>N. cornutus</i> (13)             | <i>N. spinolai</i> (one record: "Veracruz") |
| <i>N. diabolus</i> (19)             | <i>N. spoliator</i> (17)                    |
| <i>N. fallax</i> (11)               | <i>N. sumichrasti</i> (12)                  |
| <i>N. fumosus</i> (20)              | <i>N. swainsoni</i> (14)                    |
| <i>N. fuscipennis</i> (7)           | <i>N. texanus</i> (13)                      |
| <i>N. graciellae</i> (9)            | <i>N. tristis</i> (16)                      |
| <i>N. guerini</i> (18)              | <i>Nomamyrmex</i>                           |
| <i>N. halidayi</i> (7)              | <i>N. esenbecki mordax</i> (21)             |
| <i>N. harrisi</i> (7)               | <i>N. esenbecki wilsoni</i> (21)            |
| <i>N. impudens</i> (9)              | <i>N. hartigi</i> (21)                      |

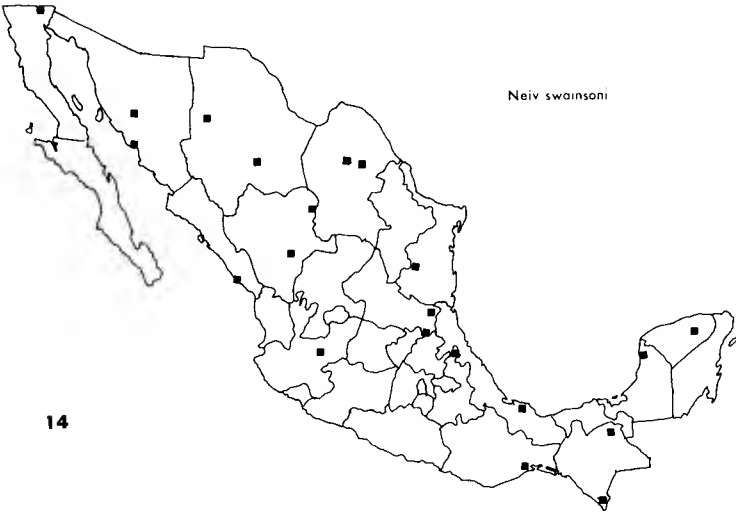






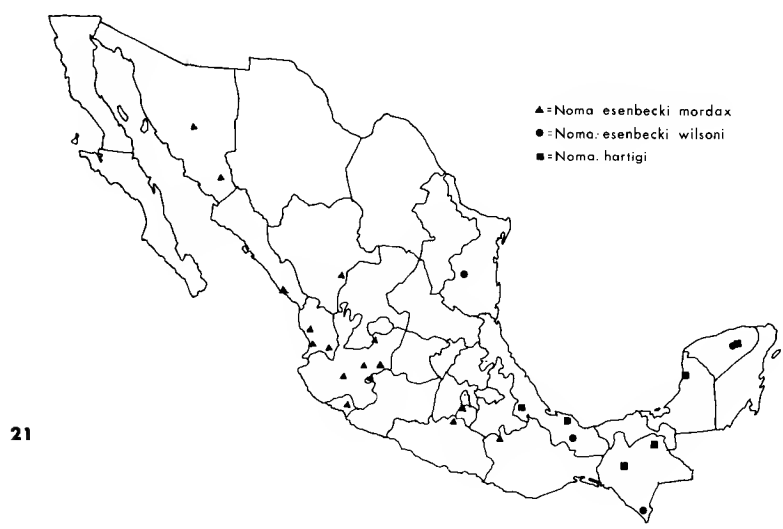
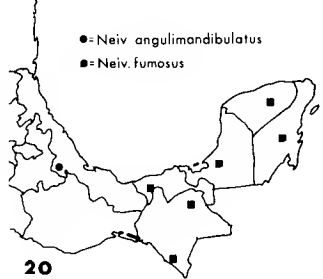
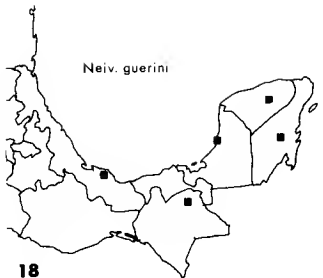
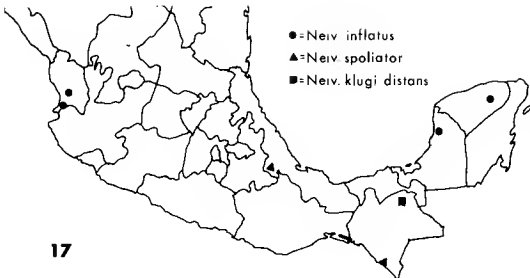












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